

# Rhodora

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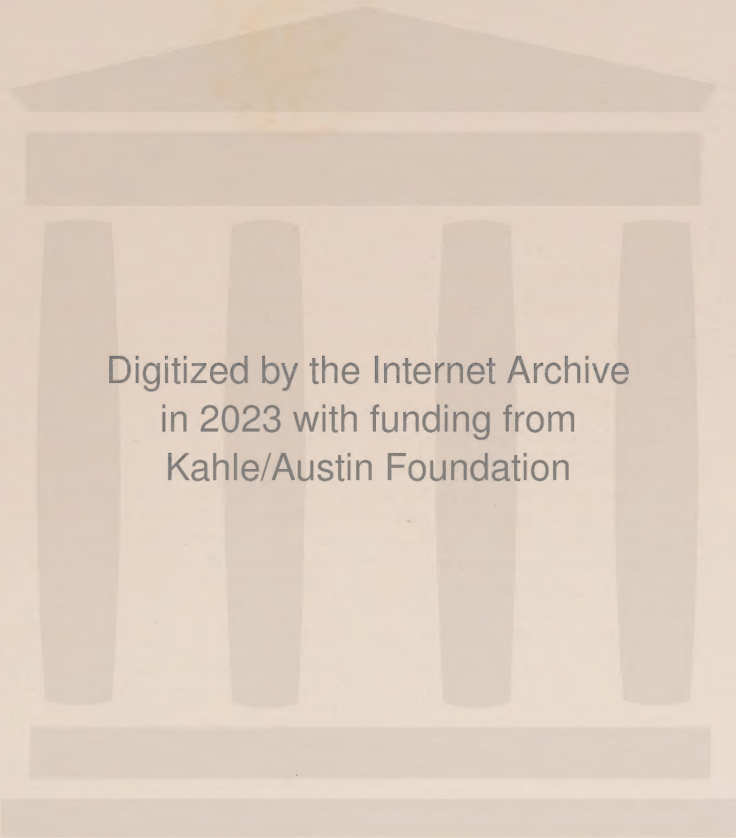
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HEDYSARUM GREMIALE: FIG. 1, ISOTYPE,  $\times \frac{1}{3}$ ; FIG. 2, loment,  $\times 3$ ; FIG. 3, summit of flowering raceme,  $\times 3$ .

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD  
UNIVERSITY—NO. CXXXI

## I. STUDIES IN THE GENUS *HEDYSARUM* IN NORTH AMERICA

REED C. ROLLINS<sup>1</sup>

(PLATE 597)

SETACEOUS processes upon the reticulate lines or rib-like markings of the loment of *Hedysarum* are found in species which occur in northern Africa, certain parts of Europe and in Asia, but no species with this unusual characteristic has been recorded from America. It was, therefore, quite surprising when in 1937 plants of this genus with fruits bearing numerous setae were discovered growing in a decidedly undisturbed native habitat in the Uinta Basin of northeastern Utah. This discovery immediately raises the question as to whether these outgrowths upon the fruits are merely parallel developments in unrelated sections of *Hedysarum* or whether they indicate a close fundamental relationship between all species that possess them, despite wide geographic separation. If the latter is true, it will be agreed that a new interpretation of the geographical distribution of *Hedysarum* must be made, properly relating our new plant to those of the Old World. Since its discovery, the new plant has received intermittent attention with the view to determining its relationships and probable position in *Hedysarum* as a whole. To elucidate facts of relationship, distribution and speciation, and

<sup>1</sup> Society of Fellows of Harvard University.



in order to present a coördinated picture of the genus as it occurs in North America south of the Yukon Territory and Alaska, a rather detailed consideration of *Hedysarum* has been necessary. The Yukon Territory and Alaska have been excluded from the present treatment because much of the material which ought to be studied is in the hands of Dr. Eric Hultén in Sweden and its return to America must await the termination of the present war. There are no questions involving name-priority which would be affected by specific names based on plants from this area.

De Candolle<sup>1</sup> in his monumental work upon the Leguminosae used, in part, muricate or glochidiate processes on the fruits to characterize section *Echinolobium* of *Hedysarum* and to separate it from the only other section recognized, *Leiolobium*. The two sections were clarified in his Prodrum<sup>2</sup> by the actual listing of the species belonging to each. That this classification was drawn along artificial lines apparently was first recognized by Basiner,<sup>3</sup> who reclassified the genus by using an entirely new set of characters. The essential features of Basiner's treatment have been accepted and used by Boissier<sup>4</sup> and more recently by Fedtschenko<sup>5</sup> in his world-wide monograph of the genus. The latter work<sup>6</sup> has been the most valuable single reference during the course of the present study, but the treatment of American plants is not satisfactory and reflects, perhaps, an inadequacy of material upon which the monographer based his decisions regarding our species. All the American plants were placed by Fedtschenko in "subtribe" *Gamotion*, which supposedly contained only those species with at least the lower stipules united. Actually, of the two separable groups of species found in America, one has the lower stipules frequently partially free and those above often entirely free, the other has the lower stipules always united and the upper somewhat united or in rare instances nearly free. On the basis of united or free stipules alone, some of our plants would fall into "subtribe" *Eleutherotion* where they obviously do not

<sup>1</sup> Mem. Legumin. 345 (1825).

<sup>2</sup> Prod. Syst. Nat. 2: 340-44 (1825).

<sup>3</sup> Mem. Acad. Petrop. 6: 45-97 (1846).

<sup>4</sup> Fl. Orientalis 2: 511-25 (1872).

<sup>5</sup> Acta Hort. Petrop. 19: 185-325 (1902).

<sup>6</sup> I am indebted to Mr. F. J. Whitefield, one of my colleagues in the Society of Fellows, for translating several passages from the Russian.

belong. In view of this fact, it appears that the use of this stipule-character, without others to support it, leads to a somewhat artificial division of *Hedysarum*, at least in so far as the American species are concerned.

Plants of *Hedysarum* in North America are divisible into two natural groups. One, which fits into section *Obscura* of Fedtschenko, has prominently veined leaflets; articles of the loment wing-margined, surface reticulations or areolae of the articles nearly as broad as long; unequal calyx-teeth which are much shorter than the tube, and linear wing-auricles which are united under the standard and equal or exceed the claw of the wings in length. In this group belong *H. alpinum*, *H. occidentale* and *H. sulphurescens*. In the other group, which does not fit clearly into any of the published subdivisions of the genus, the leaflet-veins are hidden; the articles of the loment are wingless, surface reticulations or areolae are transversely oblong to rectangular, hence much longer than broad; the nearly equal calyx-teeth are linear-subulate and longer than the tube; and the wing-auricles are free, short, broad and less than a third the length of the wing-claw. Here I place *H. boreale*, *H. Mackenzii* and *H. gremiale*. The characters which have been used to separate these two groups are surprisingly definite and have stood the test of dozens of flower-dissections in American material. It doubtless is true that this subdivision can be employed in classifying certain Asiatic species of *Hedysarum*, as a cursory examination of some of them has indicated, but it is not my purpose to so extend the present investigation.

As indicated above, *H. boreale*, *H. Mackenzii* and *H. gremiale* are not well-placed in any of the established subdivisions of *Hedysarum*, but according to the treatment of Fedtschenko they must be referred to section *Multicaulia*. Into this section both spiny-fruited and spineless-fruited species are admitted. That species with both types of fruit are sufficiently related to be placed in the same section of *Hedysarum* appears to be in accord with the facts, for my own studies indicate that *H. gremiale* is more nearly related to *H. boreale* var. *cinerascens* than to any spiny- or setose-fruited species from Africa, Europe or Asia. It must be concluded, therefore, that the discovery of a setose-fruited species of *Hedysarum* in America does not mean that



there has been a recent genetical connection between this species and those of the Old World, but that this striking feature of the loment has probably arisen independently in America from forms without spiny fruits. Such a supposition is supported to some extent by the fact that occasional plants of *H. boreale* var. *cinerascens* tend to have muricate reticulations on the loment-segment over the seed, and, in at least one case (*Tweedy* no. 132 from the Tongue River in Wyoming), short but definite nubbin-like spines have been developed.

I am indebted to the curators of herbaria in the following institutions who have loaned material or made facilities available for my use: Gray Herbarium of Harvard University (G); Forest Service, U. S. Department of Agriculture (FS); North Dakota Agricultural College (NDA); New York Botanical Garden (NY); U. S. National Museum (US). Dr. Theodor Just of the University of Notre Dame has supplied pertinent information concerning some of Greene's types. Cited collections followed by the symbol (R) are in my own herbarium.

SYNOPSIS OF THE GENUS *HEDYSARUM* L. IN NORTH AMERICA,  
EXCEPTING ALASKA AND THE YUKON TERRITORY

Herbaceous perennials; stems several to numerous from a ligneous root, decumbent to erect, terete, more or less longitudinally grooved, usually appressed-pubescent at least above, often densely so; leaves odd-pinnate, petiolate, leaflets nearly sessile, often apiculate, mostly puncticulate above; stipules united or sometimes free, chartaceous; inflorescence racemose, axillary, peduncled; flowers erect to reflexed, pink to purple, yellowish or white; calyx bracteolate, campanulate, five-toothed, pubescent; corolla glabrous, wings and standard shorter than the keel; stamens diadelphous (9 & 1), included; fruit a loment with elliptical to suborbicular articles; single-seeded articles pubescent or glabrous, areolate, wing-margined or the wings absent; loment usually stipitate.

KEY TO THE SPECIES

- a. Auricles of the wings united, linear, equaling or nearly equaling the claw; calyx-teeth markedly unequal, upper nearly triangular; articles of loment wing-margined, areolae about as broad as long; leaflets conspicuously veined.



- b. Articles of the loment 3.5–5 mm. broad, narrowly wing-margined, nearly orbicular to slightly oblong; flowers less than 18 mm. long; leaflets mostly oblong to narrowly oblong, 4–7 (–10) mm. wide
  - 1. American varieties of *H. alpinum*.
- b. Articles of the loment 6–13 mm. broad, conspicuously wing-margined, elliptical to broadly oblong; flowers at least 16 mm. long or if shorter then sulphur-yellow; leaflets mostly ovate to ovate-lanceolate, 6–14 (–20) mm. wide.
  - c. Flowers sulphur-yellow, 15–18 mm. long; leaflets glabrous above; loment glabrous; keel truncate ..... 2. *H. sulphurescens*.
  - c. Flowers reddish-purple, 16–20 mm. long; leaflets usually pubescent above; loment pubescent or very rarely glabrous; keel rounded ..... 3. *H. occidentale*.
- a. Auricles of the wings not united, blunt, much shorter than the claw; calyx-teeth nearly equal, linear-subulate; articles of the loment wingless, areolae transversely elongated; leaflet-veins hidden.
- d. Articles of the loment covered with setae; loment divaricate; leaflets pubescent on both sides ..... 4. *H. gremiale*.
- d. Articles of the loment free of setae; loment divaricate to pendent; leaflets glabrous above or pubescent on both surfaces.
  - e. Inflorescence elongated; stems branched above, 2–6 dm. high; stipules dark brown; leaflets pubescent on both surfaces or glabrous above, usually dull slate-colored above; flowers 12–19 mm. long; nodes of the loment narrow, less than half as broad as the articles; articles 2–5 ..... 5. *H. boreale*.
  - e. Inflorescence congested; stems usually unbranched above, 1–3.5 dm. high; stipules whitish-translucent, brown-streaked; leaflets green and glabrous above, rarely slightly pubescent; flowers 18–21 mm. long; nodes of the loment more than half as broad as the articles; articles 4–8 ..... 6. *H. Mackenzii*.

1. AMERICAN VARIETIES OF *H. ALPINUM*. Herbaceous perennial, stems numerous, terete, longitudinally grooved, branched above, sparsely appressed-pubescent, 2–7 dm. high; stipules connate, brown, 5–15 mm. long, lower large and obtuse, upper acute; leaves petiolate, 6–15 cm. long; leaflets 15–21, glabrous and obscurely punctulate above, sparsely pubescent (particularly along mid-vein and margins) below, prominently veined, broadly lanceolate to oblong, usually obtuse, rarely nearly acute, apiculate, 10–25 mm. long, 5–10 mm. wide; inflorescence racemose, elongated, often somewhat secund; flowers deflexed, 12–18 mm. long, reddish-purple; calyx pubescent, teeth unequal, 1–2 mm. long, shorter than the tube, upper short and triangular, lower narrower and longer; standard broadly spatulate to obovate, emarginate, 11–14 mm. long; wings narrowly oblong to linear, blunt, 10–13 mm. long, about 2 mm. wide, claw 2–3 mm. long, wing-auricles linear, united beneath standard, equaling the claw;

laments mostly stipitate, glabrous to appressed-pubescent, pend-ent; articles 2-5, rarely one, 5-7 mm. long, 3.5-5 mm. wide, suborbicular to slightly longer than broad, wing-margined; are-olae mostly polygonal, nearly as broad as long.

KEY TO THE AMERICAN VARIETIES OF *H. ALPINUM* L.

Laments glabrous to very sparingly pubescent along the margins.

Flowers 12-15 mm. long; inflorescence elongated; stems nearly erect, 3-5 dm. high ..... 1a. var. *americanum*.

Flowers 15-18 mm. long; inflorescence subcapitate to some-what elongated; stems decumbent, 2-4 (-5) dm. high

1b. var. *grandiflorum*.

Laments pubescent on both surfaces, rarely glabrate .... 1c. var. *philoscia*.

1a. Var. *AMERICANUM* Michx. ex Pursh, Fl. Am. Sept. **2**: (1816); Fernald in *RHODORA* **28**: 216 (1926); Raup in Contrib. Arn. Arb. **6**: 181 (1934); Bull. Nat. Mus. Can. **74**: 148 (1935). *H. alpinum americanum* Michx., Fl. Bor.-Am. **2**: 74 (1803). *H. alpinum* sensu Marie-Victorin, Fl. Laurent. 352 (1935), non L. *H. alpinum* subsp. *americanum* Fedtsch. in Acta Hort. Petrop. **19**: 255 (1902) in part. *H. alpinum* var. *americanum* f. *albiflorum* Fernald in *RHODORA* **35**: 275 (1933). *H. americanum* Britt. in Mem. Torr. Bot. Club **5**: 201 (1894); Britt. and Brown, Ill. Fl. **2**: 311 (1897); Rydberg, Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. Pl. Cent. N. Am. 487 (1932). *H. boreale* sensu De Candolle, Prod. Syst. Nat. Veg. **2**: 343 (1825) in part; Hooker, Fl. Bor.-Am. **1**: 155 (1834); Torrey and Gray, Fl. N. Am. **1**: 356 (1838); Wood, Classbook Bot. ed. 2, 230 (1847); Gray, Man. ed. 2, 98 (1856); Provancher, Fl. Canad. **1**: 151 (1862); Stevens, Fl. Plants, 348 (1910); Henry, Fl. So. Brit. Columb. 192 (1915); non Nuttall. —Newfoundland to northern Maine and Vermont; Manitoba to British Columbia and probably Alaska. NEWFOUNDLAND: Bard Harbor Hill, Highlands of St. John, Aug., 1925, Fernald & Long 28627 (G); Bishop Falls, valley of Exploits River, July, 1911, Fernald, Wiegand & Darlington 5800 (G); Grand Falls, valley of Exploits River, July, 1911, Fernald, Wiegand & Darlington 5798 (G). QUEBEC: between Mont Louis and Rivière à Pierre, Aug., 1923, Fernald & Smith 25875 (G); Gulf of St. Lawrence, east of Marten River, Gaspé Co., July, 1922, Fernald & Pease 25171 (G); St. John River, Gaspé Co., Aug., 1904, Collins, Fernald & Pease s. n. (G); Tourelle, Gaspé Co., July, 1924, Pierce & Hodge 7a (G); Bic, Rimouski Co., July, 1904, Collins & Fernald s. n. (G); Aug., 1927, Rousseau 26823 (G); Renard River, Anticosti Island, Aug., 1927, Marie-Victorin & Rolland-Germain 27354 (G); Natiskotek River, Anticosti Island, Aug., 1927, Marie-Victorin & Rolland-Germain 27356 (G); between Baldé and Baie des Chaleurs, Bonaventure Co., Aug., 1904, Collins, Fernald



& *Pease* s. n. (G) ; Lake St. Jean, July, 1921, *Marie-Victorin* s. n. (G). NEW BRUNSWICK: Gorge of the Aroostook River, Victoria Co., Aug., 1909, *Fernald* 1962 (G) ; July, 1902, *Williams, Collins & Fernald* s. n. (G) ; Connors, St. John River, July, 1903, *Pease* 2262 (G). MAINE: St. John River, St. Francis, July, 1932, *Pease & Goodale* 67773 (G) ; Aug., 1893, *Fernald* 26 (G) ; Fort Fairfield, July, 1902, *Williams, Collins & Fernald* s. n. (G) ; Fort Kent, July, 1908, *Mackenzie* 3536 (NY). VERMONT: Wil-  
loughby, July, 1887, *E. & C. E. Faxon* s. n. (G) ; Aug., 1874, *Congdon* s. n. (G) ; Smuggler's Notch, Mt. Mansfield, July, 1894, *Eggleston* s. n. (G, NY) ; Aug., 1877, *E. & C. E. Faxon* s. n. (G) ; July & Aug., 1877, *Pringle* s. n. (G). MANITOBA: 6 miles east of Forest, June, 1906, *Macoun & Heriot* 70783 (G). SASKATCHEWAN: 30 miles east of Touchwood, July, 1906, *Macoun & Heriot* 70784 (G) ; Duck Lake, July, 1913, *Johnson* 1375 (NY). ALBERTA: Kootenai Plains, North Branch Saskatchewan River, June, 1908, *Brown* 946 (G, NY) ; Peace Point, Wood Buffalo Park, Aug., 1928, *Raup* 2803 (G) ; Government Hay Camp district, Wood Buffalo Park, Aug., 1928, *Raup* 2807 (G) ; Water Coulee, near Rosedale, June, 1915, *Moodie* 948 (G.) ; Calgary, June, 1903, *Barber* 240 & 262 (G.) ; near Banff, Aug., 1900, *Prince* s. n. (G.) ; July, 1897, *Van Brunt* 20 (NY) ; Cypress Hills, June, 1894, *Macoun* 4534 (G). BRITISH COLUMBIA: vicinity of Hudson Hope, June, 1932, *Raup & Abbe* 3626 (G).

1b. Var **grandiflorum**, var. nov. Herba perennis; caulibus decumbentibus, 2–4 (–5) dm. longis; floribus purpurascens, 15–18 (–19) mm. longis.—*H. alpinum* sensu Fernald in RHODORA **13**: 119 & 129 (1911) ; *ibid.* **28**: 216 (1926) ; *ibid.* **35**: 275 (1933) ; Raup in Contrib. Arn. Arb. **6**: 181 (1934) ; non L. *H. alpinum* var. *americanum* sensu Ostenfeld in Vidensk. Selsk. Skrift. I Klasse, no. 8, 55 (1909), non Michx. ex Pursh.—Labrador, Newfoundland, northern Alberta and British Columbia. LABRADOR: Forteau, 1870, *S. R. Butter* s. n. (G). NEWFOUNDLAND: Port à Port, July, 1921, *Mackenzie & Griscom* 10332 (G, US) ; Table Mountain, region of Port à Port Bay, July, 1914, *Fernald & St. John* 10849 (G) ; Cook Point, Pistolet Bay, July, 1925, *Fernald & Gilbert* 28622 (G) ; Anse aux Sauvages, Pistolet Bay, Aug. 11, 1925, *M. L. Fernald, K. M. Wiégand & Bayard Long* 28625 (G, TYPE) ; west of Big Brook, Straits of Belle Isle, *Long & Gilbert* 28620 (G) ; Sandy Cove, Straits of Belle Isle, Aug., 1924, *Fernald, Long & Dunbar* 26810 (G) ; Killdevil, Bonne Bay, Aug., 1929, *Fernald, Long & Fogg* 1835 (G) ; Eastern Point, region of St. John Bay, July, 1929, *Fernald, Long & Fogg* 1833 (G). ALBERTA: head of Malique Lake, July, 1908, *Brown* 1218 (G, NY) ; Cataract Cr., headwaters of the Saskatchewan and Athabasca Rivers, Aug., 1908, *Brown* 1452 (G) ; head of Smoky



River, Aug., 1911, *Riley* 36 (G). BRITISH COLUMBIA: Mt. Selwyn, July, 1932, *Raup & Abbe* 3967 & 4091 (G).

1c. Var. **philoscia** (A. Nels.) comb. nov. *H. philoscia* A. Nelson in Proc. Biol. Soc. Wash. **15**: 185 (1902); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909). *H. boreale* sensu Rydb., Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. Plains Cent. N. Am. 487 (1932); non Nuttall.—Saskatchewan and Alberta to South Dakota and Wyoming. SASKATCHEWAN: without locality, 1858, *E. Bourgeau* s. n. (G, NY). ALBERTA: Fort Saskatchewan, July, 1938, *Turner* 58 & 59 (G). SOUTH DAKOTA: Rochford, Black Hills, July, 1892, *Rydberg* 640 (G); Black Hills, July, 1872, *Greene* 13 (NY); near Custer Peak, Lawrence Co., June, 1929, *Palmer* 37554 (G); Deerfield, Pennington Co., June, 1929, *Palmer* 37509 (G). WYOMING: Boyd, Weston Co., July, 1910, *A. Nelson* 9436 (G); Willow Creek, Albany Co., July, 1897, *A. Nelson* 3367 (G); Crow Creek, Albany Co., Aug., 1903, *A. Nelson* 8955 (G); Laramie Hills, Albany Co., July, 1901, *E. Nelson* 622 (G, NY).

In eastern Asia, as in America, there are several phases and varieties of *H. alpinum*. The exact application of Linnaeus' name to Siberian material, except in the broad sense, has not been attempted in the present study. It is evident from a careful examination of Siberian specimens of *H. alpinum* in the Gray Herbarium and in the United States National Herbarium, that the plants heretofore passing as *H. boreale* in such works as Torrey and Gray's *Flora*<sup>1</sup> and Gray's *Manual*,<sup>2</sup> and as *H. americanum* in Britton and Brown's *Flora*<sup>3</sup> and Rydberg's *Flora*<sup>4</sup> are not specifically distinct from those of eastern Asia. However, the North American plants do differ in certain minor ways and should be considered as separate varieties of a wide-ranging species, *H. alpinum*, which extends from Asia across the north to Newfoundland, Gaspé and Maine and southward along the mountains of western America. Such a treatment indicates clearly the relationships of our plants with those of Asia, and at the same time shows that the American plants have certain special characteristics which are not possessed by those of the Old World. The differences separating the Old World plants from those of the New, particularly those emphasized by Hooker,<sup>5</sup> are at best

<sup>1</sup> Fl. N. Am. **1**: 356 (1838).

<sup>2</sup> Robinson and Fernald in Gray's *Manual* 7th. ed. 518 (1908).

<sup>3</sup> Ill. Fl. **2**: 311 (1897).

<sup>4</sup> Fl. Rky. Mts. adj. Plains 524 (1917).

<sup>5</sup> Fl. Bor.-Am. **1**: 155 (1834).

only trivial. Certainly the actual differences are not of sufficient importance to justify specific segregation and, in my opinion, it is a mistake to obscure the natural relationships of our plants by giving them a separate specific epithet. The misapplication of the name *H. boreale* is dealt with under that species.

*H. alpinum* in America has three geographic varieties which are very closely related, but which have certain characteristics peculiar to themselves. Variety *philoscia* is very similar to var. *americanum* except for its densely pubescent instead of glabrous fruits. This difference is not absolute, for there are specimens with fruits pubescent along the margins or even with a very few trichomes along the edges of the flat surfaces of the loments which I have referred to var. *americanum*. Plants of the latter type are apparently of rare occurrence, but they indicate that intermediates between the two varieties actually exist and that attempts to establish either as a distinct species should be regarded with suspicion. Variety *grandiflorum* is a more dwarfed, larger-flowered plant than its nearly related var. *americanum*, and the two are usually quite easily distinguished, but here again, as far as herbarium material shows, there is a gradual transition from one to the other. Variety *grandiflorum* inhabits the headlands of Newfoundland and barrens of northern Canada, while var. *americanum* ranges southward in more favorable habitats. Their most distinctive characters have been set forth in the key above.

2. *H. SULPHURESCENS* Rydberg. Herbaceous perennial, stems several to numerous from a ligneous root, shallowly furrowed longitudinally, branched above, appressed-pubescent, 2–6 dm. high; stipules united, brown, chartaceous, lower obtuse, 1–1.5 cm. long, upper acute to acuminate, reduced; leaves petiolate, 8–12 cm. long; leaflets 9–17, elliptical to ovate-oblong, usually apiculate, conspicuously veined, sparsely pubescent below, glabrous and punctulate above, 15–30 (–40) mm. long, 5–10 (–15) mm. wide; inflorescence axillary, racemose, elongated; flowers pendent, ochroleucous to yellow, 15–18 mm. long; calyx pubescent, teeth unequal, shorter than tube, 1–3 mm. long, upper shorter and broader than the lower; standard obovate-cuneate, emarginate, 12–14 mm. long, 6.5–8 mm. wide; wings obtuse, 12–14 mm. long, 2.5–3 mm. wide, wing-auricles linear, united under standard, equaling the claw, 3–3.5 mm. long; keel sharply truncate; loments pendent, stipitate, articles 1–4, conspicuously wing-margined,

glabrous, asymmetrically elliptical, 8–12 (15) mm. long, 6–8 (9) mm. wide; reticulations not raised, polygonal.—Bull. Torr. Bot. Club **24**: 251 (1897); Mem. New York Bot. Gard. **1**: 257 (1900); Piper in Contrib. U. S. Nat. Herb. **11**: 367 (1906); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 300 (1909); Rydberg, Fl. Rky. Mts. adj. Plains 523 (1917). *H. flavescens* Coult. and Fisch., Bot. Gaz. **18**: 300 (1893), non *H. flavescens* Regel and Schmalh. ex Regel in Bull. Soc. Sci. Moscow **34**: 21 (1882). *H. boreale* Nutt. var. *flavescens* (Coult. and Fisch.) Fedtsch. in Bull. Herb. Boiss. **7**: 256 (1899). *H. boreale* Nutt. var. *albiflorum* Macoun, Cat. Canad. Pl. **1**: 510 (1884). *H. albiflorum* (Macoun) Fedtsch. in Acta Hort. Petrop. **19**: 252 (1902). *H. boreale* Nutt. var. *leucanthum* sensu M. E. Jones in Proc. Calif. Acad. Sci. **5**: 677 (1895), non *H. Mackenzii* Richards. var. *leucanthum* Greene, Pitt. **2**: 294 (1892).—Alberta and British Columbia to Washington, Idaho and Wyoming. ALBERTA: Pipestone Valley, July, 1906, *Brown* 425 (G); Bow River Valley, June, 1906, *Brown* 127 (G); Lake Louise, Aug., 1904, *Edith Farr* s. n. (G); between Lake Louise and Lake Louise Station, Sept., 1927, *Eggleston* 21810 (US); Laggan, July, 1904, *J. Macoun* s. n. (G); vicinity of Banff, June–July, 1899, *McCalla* 2140 (US). BRITISH COLUMBIA: Burgess Trail near Field, July, 1906, *Brown* 537 (G); Sept., 1904, *Shaw* 591 (G); Crows' Nest Pass, July, 1883, *Davies* 63 (G); Kananaskis, June, 1885, *J. Macoun* (G, ISOTYPE of *H. boreale* var. *albiflorum*). MONTANA: upper Marias Pass, Aug., 1883, *Canby* 93 (G); McDonald's Peak, Mission Range, July, 1883, *Canby* 90 (G); Cutbank Creek, Glacier Nat. Park, July, 1934, *G. N. Jones* 5425, 5438 and 5513 (G); Mt. Haggin, near Anaconda, July, 1915, *M. E. Jones* s. n. (G); Bozeman, July, 1895, *Shear* 5269 (US); Bridger Mts., Gallatin Co., Aug., 1902, *W. W. Jones* (G); Baldy Mountain, Park Co., June, 1912, *Eggleston* 8079 (G); Pioneer, July, 1898, *J. K. Uhl* s. n. (G, NDA); Beartooth Mts., 17 miles southwest of Red Lodge, Carbon Co., July, 1939, *Rollins & Muñoz* 2828 (G); West Fork of Sun River, Lewis and Clark Nat. For., Aug., 1912, *Saunders* 174 (FS); north slope of Pryor Mt., Beartooth Nat. For., June, 1926, *Williamson* 2 (FS). WYOMING: Little Tongue River Canyon, Big Horn Mts., Sheridan Co., June, 1936, *L. & R. Williams* 3112 (G); 20 mi. west of Dayton, Sheridan Co., July, 1935, *L. Williams* 2364 (G); Beartooth Butte, Park Co., Aug., 1937, *L. & R. Williams* 3767 (G); near Cody, Yellowstone Nat. Park, July, 1930, *Churchill* s. n. (G); Wraith Falls, Yellowstone Nat. Park, July, 1899, *A. & E. Nelson* 5706 (G). IDAHO: south end of Lake Pend d'Oreille, July, 1892, *Sandberg, MacDougal & Heller* 748 (G); Targhee Nat. For., Aug., 1911, *Willey* 161 (FS). WASHINGTON: near Winthrop, Okanogan Co., July, 1934, *Thompson* 10913 (G);



road to Salmon Meadows, Okanogan Co., June, 1931, *Thompson* 7024 (G).

Fedtschenko<sup>1</sup> expressed doubt concerning the ultimate validity of *H. sulphurescens* (*H. albiflorum*) as a specific entity, stating that it was very close to *H. alpinum* var. *japonicum* and an undesignated variety of *H. obscurum*. Recently, Hara<sup>2</sup> named var. *japonicum*, in the sense of Fedtschenko, as a species, which seems to indicate that the relationship is not as close as originally supposed. A careful study of the Asiatic plants referred to, shows that they are in the same species-group, but that they are not conspecific with the American plants. Our plants belong to the "*alpinum*" group, but are actually most closely related to *H. occidentale* on account of the large, widely wing-margined loment. Besides having yellowish instead of reddish-purple flowers, *H. sulphurescens* differs from *H. occidentale* in having glabrous instead of pubescent fruits, smaller flowers and a more sharply angled truncate keel. These two species probably had a common origin, but in my opinion, they have now developed differentiating characters which are constant enough to merit for each the rank of a species. *H. sulphurescens* occupies a unified phytogeographical area in the northern Rocky Mountains and adjacent ranges.

3. *H. OCCIDENTALE* Greene. Herbaceous perennial, stems several to numerous from a ligneous root, longitudinally furrowed, pubescent, branched above, 3–7 dm. high; stipules brown, chartaceous, united, fragile, lower obtuse, upper acuminate; leaves petiolate to nearly sessile, 8–12 cm. long; leaflets 11–19, ovate, elliptical or broadly oblong, apiculate, sparsely pubescent on both surfaces or rarely glabrous above, punctulate above, conspicuously veined, 12–25 (–30) mm. long, 7–14 mm. wide; inflorescence racemose, axillary, elongated, 6–13 cm. long; flowers pendent, reddish-purple, 16–20 mm. long; calyx pubescent, teeth unequal, 1–3.5 mm. long, upper short, triangular, lower nearly subulate, shorter than the tube; standard obovate-spatulate, emarginate, 13–15 mm. long, 6.5–7.5 mm. wide at widest point; wings 13–15 mm. long, 2–3 mm. wide, linear-oblong, wing-auricles united under the standard, linear, equalling the claw, 3–4 mm. long; loment pendent, stipitate; articles 1–4, elliptical, conspicuously wing-margined, pubescent or rarely glabrous, 9–14 mm. long, 7–13 mm. wide, reticulations polygonal.—Pitt. 3: 19

<sup>1</sup> Fedtschenko, op. cit. p. 253.

<sup>2</sup> Journ. Jap. Bot. 15: 52 (1939).

(1896); Piper in Contrib. U. S. Nat. Herb. **11**: 366 (1906); Piper and Beattie, Fl. Northw. Coast **225** (1915); G. N. Jones in Univ. Wash. Pub. Biol. **5**: 188 (1936). *H. marginatum* Greene, Pitt. **4**: 138 (1900); Rydberg, Fl. Colo. **215** (1906); Fl. Rky. Mts. adj. Plains **524** (1917); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. **300** (1909). *H. uintahense* A. Nelson in Proc. Biol. Soc. Wash. **15**: 186 (1902); Coulter and Nelson, op. cit. p. 300. *H. lancifolium* Rydb. in Mem. New York Bot. Gard. **1**: 256 (1900); Fl. Rky. Mts. adj. Plains **524** (1917).—Washington to Montana, Colorado and Utah. MONTANA: Moser Mt., Flathead Nat. For., Aug., 1925, *Kirkwood 2187* (G, NY); Thompson Falls, Aug., 1909, *Butler 5058* (NY); Jocko Range, Aug., 1880, *S. Watson 95* (G); near Gunsight Lookout Station, Flathead Nat. For. July, 1928, *Liebig 303* (FS); West Fork Teton River, Lewis and Clark Nat. For., Aug., 1921, *Lane D2-3* (FS). WYOMING: headwaters of Clear Creek and Crazy Woman Creek, Big Horn Mts., July–Aug., 1900, *Tweedy 3193* (NY); Soldier's Park, Big Horn Mts., Aug., 1898, *T. A. Williams s. n.* (US); on the Red Grade near the top, eastern slope of the Big Horn Mts., June, 1934, *Rollins 503* (G, NY); Teton Pass, July, 1920, *E. B. & L. B. Payson 2096* (G, NY); July, 1901, *Merrill & Wilcox 977* (G, NY); Two-gwo-tee Pass, July, 1932, *L. Williams 955* (G); Mt. Wagner, southeast of Smoot, Aug., 1923, *Payson & Armstrong 3749* (G); Evanston, Uinta Co., June, 1900, *A. Nelson 7198* (G, NY, ISOTYPES of *H. uintahense*); near Big Muddy Creek, between Fort Bridger and Evanston, June, 1938, *Rollins 2323* (G); Ashley Nat. For., Uinta Co., June, 1924, *Kane 6* (FS). UTAH: near Mill Creek, Summit Co., July, 1926, *E. B. & L. B. Payson 4881* (G, NY). COLORADO: White River Nat. For., June–July, 1910, *Reynoldson 81* (FS); 6 miles northwest of the Rio Grande Reservoir, Hinsdale Co., Aug., 1936, *Rollins 1503* (G, NY); Pagosa Springs, July, 1899, *Baker 429* (G, NY); near La Plata, July, 1898, *Baker, Earle & Tracy 464* (G, NY); Silverton, Aug., 1897, *Shear 5227* (NY); foot of Mt. Hesperus, La Plata Mts., Aug., 1892, *Eastwood s. n.* (NY); Rio Grande Nat. For., July, 1924, *Lister 75* (FS). IDAHO: hills southeast of Victor, Teton Co., July, 1920, *E. B. & L. B. Payson 2167* (G, NY); Caribou Mt., Bonneville Co., July, 1923, *Payson & Armstrong 3538* (G); ridges south of Wiesner's Peak, July, 1895, *Leiberg 1366* (NY); divide between St. Joe and Clearwater River's, July, 1895, *Leiberg 1213* (G, NY); Waterfall Canyon, Targhee Nat. For., July, 1929, *Richwine 4* (FS); head of Georgetown Canyon, Caribou Nat. For., June, 1926, *Phinney 89* (FS). WASHINGTON: *Olympic Mts.*: without definite locality, July, 1890, *Henderson 1850* (G); 1889, *Grant 156* (G); Aug., 1895, *Piper 2227* (US); June, 1900, *Elmer 2529* (US); Mount Angeles,

Aug., 1931, *Thompson* 7831 (G) ; July, 1933, *Thompson* 9471 (G, US) ; Hurricane Ridge, Sept., 1937, *Thompson* 14176 (G, US) ; Blue Mountain, Deer Park Recreational Area, Aug., 1938, *Rollins & Chambers* 2693 (G) ; Bogachiel Ridge, headwaters of the Hoh River, Aug., 1938, *Rollins & Chambers* 2704 (G) ; Mt. Colonial Bob, July, 1931, *Thompson* 9968 (G, US) ; Aug., 1933, *Thompson* 9968 (G) ; Mt. Baldy, July, 1897, *Lamb* 1318 (US).

*H. occidentale* is most nearly related to *H. sulphurescens*, from which it differs in having reddish-purple instead of light yellow flowers, usually pubescent instead of glabrous fruits and more leaflets on each compound leaf. There are 13 to 19 leaflets with pubescent upper surfaces in *H. occidentale*, whereas in *H. sulphurescens* the 9–15 leaflets are glabrous above. Also, the flowers and fruits of the former are uniformly larger than those of the latter. Both these species are related in a general way to the American varieties of *H. alpinum*, but the very much larger and more broadly winged loment-articles of *H. occidentale* and *H. sulphurescens* are not matched by any other American species of the genus.

The known geographical distribution of *H. occidentale* is of interest because of the total absence of this plant from the intervening area between the Olympic Mountains of western Washington and the mountains of northern Idaho. Many other plants of boreal dispersion have a similar distribution. Doubtless a continuous range once existed to the northward, but such a continuity could hardly have survived the glacial activity which is known to have taken place in the area. This explanation presupposes a preglacial migration of *H. occidentale* from the north to the Olympic Mountains on the one hand and to the Rocky Mountains on the other. Plants from the two areas are alike in all details, hence there is no question about their belonging to the same species. *H. marginatum*, described from Colorado, and *H. unitahense*, described from Wyoming, do not differ in any significant way from *H. occidentale*. Indeed, Nelson,<sup>1</sup> in his citation of specimens accompanying the original description of *H. unitahense*, mentioned a Henderson specimen from the Olympic Mountains of Washington as probably belonging to the species he was describing. *H. lancifolium* Rydberg appears to be a leaf-form of *H. occidentale*. The actual type was not found at the New York

<sup>1</sup> Proc. Biol. Soc. Wash. 15: 156 (1902).



Botanical Garden, but specimens annotated by Rydberg and plants coming from the type-locality have proved to be narrow-leaved forms of the latter species.

There are several minor variations in *H. occidentale*, but they are mostly quantitative and are not correlated with each other or with any phytogeographical area. For example, the length of the calyx-teeth varies a millimeter or more, the size and to some extent the shape of the leaflets vary, and the total height of the plants varies with habitat and altitude. The lomenta are nearly always pubescent, but an occasional collection from Montana or Washington may have glabrous fruits. There is a slight difference, in some cases, as to the way in which the trichomes are disposed upon the loment. Often they are appressed, but in a number of collections the hairs are spreading and may even be slightly crooked. These variations, in so far as I am able to discern, are not of any real significance as far as classification is concerned, but might easily have resulted from the differences in habitat and climatic conditions under which the plants grew.

4. *H. gremiale*, sp. nov. (PLATE 597). Deep-rooted, perennial herb; stems numerous from a ligneous caudex, greenish, ascending, branched, densely pubescent with small simple appressed trichomes, terete, 3-6 dm. high; leaves odd-pinnate, densely appressed-pubescent; leaflets 5-13, oblong to elliptical, 1-2 cm. long, 5-10 mm. wide, often apiculate; stipules brownish, pubescent, chartaceous, very fragile, lower united, upper nearly free; inflorescence racemose, in fruit 1-1.5 dm. long; flowers numerous, erect, 1-1.5 cm. long; pedicels pubescent, 2-4 mm. long; calyx furnished with two small bracteoles, densely pubescent, calyx-teeth about equal, narrowly subulate, tipped with red, 4-5 mm. long; corolla pink to reddish-purple, drying purplish-pink; standard obovate, emarginate, 12-14 mm. long, about 1 cm. wide; wings about 1 cm. long, 3-3.5 mm. wide, auricles blunt, broad, not united, about 1 mm. long, claw broad, about 2 mm. long; keel blunt, 13-15 mm. long; lomenta stipitate, articles 1-5, either closely joined or with a connective of variable length, flattened, suborbicular to slightly longer than broad, prominently and loosely reticulate-nerved, rather densely appressed-pubescent, wingless, 6-8 mm. broad; nerves or costae of the articles supporting numerous spine-like or setaceous processes, these purple-tipped, 3-5 mm. long and usually with a few scattered trichomes upon them; articles one-seeded, mature seeds not seen.

Herba perennis multicaulis; caulibus erectis vel adscendentibus pubescentibus, 3–6 dm. altis; foliis imparipinnatis petiolatis; foliolis 5–13, oblongis vel ellipticis undique pubescentibus; stipulis fuscis connatis pubescentibus; inflorescentiis axillaribus racemosis; floribus erectis; calycis subcylindricis, lobis subulatis 4–5 mm. longis; corollis siccatis roseo-purpurascensibus 13–15 mm. longis; leguminibus articulatis stipitatis compressis; articulis suborbicularibus pubescentibus ciliatis reticulato-rugosis 6–8 mm. latis immarginatis in costis setosis vel subspinulosis.—*H. cinerascens* sensu Graham in Ann. Carn. Mus. **26**: 251 (1937) in part, non Rydberg. *H. utahense* sensu Graham, ibid. p. 252 in part, non Rydberg.—Known only from UTAH: *Uintah County*: heavy adobe soil in a narrow ravine, 14 miles west of Vernal, Uinta Basin, June 16, 1937, *Reed C. Rollins 1733* (G, TYPE, R, ISOTYPE); 18 miles north of Vernal, Uinta Basin, June, 1937, *Rollins 1757a* (G, R); bench west of the Green River, north of the mouth of Sand Wash, Uinta Basin, May, 1933, *Graham 7912* (G, US); Vernal-Manilla road north of Vernal, June 19, 1933, *Graham 8156* (US); Uinta Basin, June, 1912, *Peterson* s. n. (US).

Flowering plants of *H. gremiale* are difficult to distinguish from varieties of *H. boreale* which have both leaflet-surfaces pubescent, but with developing or mature fruits, there is no need for question as to which species one is observing. In the very young stage, fruits of *H. gremiale* do not show any signs of the very marked setae which later appear upon the flattened surfaces. As the fruit enlarges, small tubercles appear at various points along the surface reticulations. Soon these tubercles elongate into peculiar setae or spine-like processes which are sparsely covered with simple trichomes. *H. gremiale* is actually most closely related to *H. boreale* var. *cinerascens*, which it resembles in general habit. Both are pubescent throughout, though *H. gremiale* is much less densely covered with trichomes and less silvery in appearance than *H. boreale* var. *cinerascens*. A further clue to the relationship between these species is the occasional occurrence of very abbreviated tubercles on the lomentis of *H. boreale* var. *cinerascens*. This suggests a comparatively recent genetical connection between the two.

*H. gremiale* apparently occurs only locally in the Uinta Basin of northeastern Utah; however, the plants were very abundant in the two places where I observed them. The habitat is in the geologically young foothills of the Uinta Mountains, near the

bottom of the Basin. This limited distribution in a geologically young area points to a recent origin for *H. gremiale*. I should suggest *H. boreale* var. *cinerascens* or some other phase or variety of *H. boreale* as the probable ancestor.

5. *H. BOREALE* Nuttall. Herbaceous perennial, stems several to numerous from a ligneous root, terete, longitudinally grooved, pubescent, 2.5–6 dm. high, branched above; stipules brown, chartaceous, triangular with a subulate tip, lower united, upper nearly free; leaves short-petioled, 4–8 cm. long; leaflets 9–13, linear-oblong to nearly elliptical or those of the lower leaves obovate, densely pubescent on both surfaces to glabrous above, puncticulate above, 3–8 mm. wide, 1–2.5 cm. long, obtuse; inflorescence racemose, elongated; bracts brown, subulate, equaling or exceeding the pedicels; flowers erect, numerous, carmine, 12–19 mm. long; calyx pubescent, teeth nearly equal, subulate, 3–5 mm. long, longer than the tube; standard obovate to broadly cuneate, emarginate, 12–17 mm. long, 7–12 mm. wide; wings 10–14 mm. long, 2.5–4 mm. wide; claw broad, 2–3 mm. long, wing-auricle blunt, free, about 1 mm. long; laments pendent to somewhat divaricate, usually stipitate; articles 2–5, orbicular to suborbicular, 5–7 mm. wide, 6–8 mm. long, appressed-pubescent, not wing-margined, flattened, rugose when mature, reticulations transversely elongated.

#### KEY TO THE VARIETIES OF *H. BOREALE*

- Flowers 12–16 mm. long, erect or the lower tardily reflexed; inflorescence not interrupted; leaflets 10–15 (–20) mm. long.
- Leaflets glabrous to sparsely pubescent above, articles of the loment rugose, but not deeply wrinkled, short spines never present ..... 5a. var. *typicum*.
- Leaflets and stems silvery-canescant throughout, articles of the loment deeply wrinkled over the seed, short tubercles often present.
- Leaflets oblong to broadly linear; pubescence smooth, silvery hairs appressed, less than 1 mm. long .. 5b var. *cinerascens*.
- Leaflets obovate; pubescence shaggy, silvery hairs spreading, about 1.5 mm. long ..... 5c. var. *obovatum*.
- Flowers 16–19 mm. long, lower reflexed; inflorescence interrupted, leaflets 15–25 (–30) mm. long ..... 5d. var. *utahense*.

5a. *H. BOREALE* Nuttall, var. **typicum**. *H. boreale* Nutt., Gen. N. Am. Pl. 2: 110 (1818); Journ. Acad. Sci. Philad. 7: 19 (1834). *H. Roezlianum* Prantl, Ind. Sem. Hort. Wireeb. 8 (1873) ? *H. carnosulum* Greene, Pitt. 3: 212 (1897); Rydb., Fl. Colo. 216 (1906); Fl. Rky. Mts. adj Plains 524 (1917). *H. Mackenzii* sensu Rydb. in Mem. N. Y. Bot. Gard. 1: 257 (1900); Fedtsch. in Acta Hort. Petrop. 19: 273 (1902) in part, non Richardson. *H.*



*pabulare* A. Nels. in Proc. Biol. Soc. Wash. **15**: 185 (1902); Rydb., Fl. Colo. **215** (1906); Fl. Rky. Mts. adj. Plains **524** (1917); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. **300** (1909); Wootton and Standley in Contrib. U. S. Nat. Herb. **19**: **373** (1915); Tidestrom in Contrib. U. S. Nat. Herb. **25**: **333** (1925). *H. pabulare*, var. *rivulare* L. O. Williams in Ann. Mo. Bot. Gard. **21**: **344** (1934). *H. Mackenzii* Richards., var. *pabulare* Kearney and Peebles in Journ. Wash. Acad. Sci. **29**: **485** (1939). *H. cinerascens* sensu Tidestrom in Contrib. U. S. Nat. Herb. **25**: **333** (1925), non Rydberg. *H. utahense* sensu Graham in Ann. Carneg. Mus. **26**: **252** (1937) in part, non Rydberg.—ALBERTA to Oklahoma, Arizona and Idaho. ALBERTA: Rosedale Coulee, near Rosedale, July, 1915, *Moodie 1078* (G, NY); Rosedale Trail, near Rosedale, June, 1915, *Moodie 1020* (G); Red Deer Lakes, July, 1879, *Macoun 105* (G). NORTH DAKOTA: Donnybrook, July, 1935, *Stevens & Kluender 132* (G, US); Range 92, Township 149, Dunn Co., June, 1936, *Heidenreich* s. n. (NDA); Sanish, July, 1923, *Stevens* s. n. (NDA); Fort Buford, 1890, *Havard 2 & 3* (NY); Medora, Aug., 1923, *Stevens* s. n. (NDA); June, 1938, *Stevens & Brenkle 38-011* (G). OKLAHOMA: near Shattuck, Ellis Co., June, 1914, *Clifton 3200* (G). MONTANA: North Fork of Bear Cr., Gallatin Nat. For., Gallatin Co., *Whitham 1811* (FS); 1 mile west of Teal Lake, July, 1901, *Spragg 326* (G); Ear Mountain, Lewis and Clark Nat. For., July, 1921, *Butter D3-12* (FS); Jefferson Nat. For., Aug., 1927, *Park 65* (FS). WYOMING: Gilbert Creek, Park Co., July, 1937, *L. & R. Williams 3539* (G, NY, R); Undine Falls, Yellowstone Nat. Park, July, 1899, *A. & E. Nelson 5679* (G); along Snake River, Teton Co., July, 1932, *L. Williams 975* (G, ISOTYPE of *H. pabulare* var. *rivulare*); bars of Gros Ventre River, Teton Co., Aug., 1894, *Nelson 1087* (G); July, 1901, *Merrill & Wilcox 993* (G, NY, US); Bates Creek, Natrona Co., July, 1901, *Goodding 201* (G, US); 20 miles west of Big Piney, Sublette Co., July, 1922, *E. B. & L. B. Payson 2617* (G); 14 miles east of Evanston, Uinta Co., July, 1939, *Rollins & Muñoz 2875* (G, R). COLORADO: Canon City, Aug., 1896, *Shear 3768* (NY); June, 1917, *E. L. Johnston & Hedgecock 638* (G, NY); Trinidad, Aug., 1912, *Beckwith 91* (NY); June, 1917, *E. L. Johnston 617* (G); Trinchera Creek, about 20 miles northwest of Branson, July, 1937, *Rollins 1864* (G, R); Cimarron, Gunnison Co., June, 1901, *Baker 274* (G); mouth of Wolf Creek, White River, Rio Blanco Co., May, 1935, *Graham 9044* (G, US); Paradox, Montrose Co., June, 1912, *Walker 151* (G); Naturita, Montrose Co., May, 1914, *Payson 322* (G); Mancos, June, 1898, *Baker, Earle & Tracy 83* (G); Durango, May, 1916, *Eastwood 5311* (G). NEW MEXICO: near Cimarron, June, 1929, *Mathias 556* (G); Algodones, June, 1887,

*Tracy & Evans* 139 (NY); Canoncito, Santa Fe Co., June, 1897, *A. & E. Heller* 3732 (G); between Gallup and Albuquerque, May, 1931, *McKelvey* 2338 (G). IDAHO: Clyde, Blaine Co., July, 1916, *Macbride & Payson* 3124 (G, NY, US); Warm Springs Ranger Station, Lemhi Nat. For., June, 1928, *Schulze* 71 (FS). UTAH: Book Cliffs, Uinta Basin, July, 1935, *Graham* 9842 (US); Soldier's Summit, 1894, *M. E. Jones* 5592 (NY); Bryce Canyon, Garfield Co., July, 1938, *Rollins & Chambers* 2453 (G, R); Pleasant Cr., Powell Nat. For., Garfield Co., July, 1915, *Hanks* 6 (FS); Millard Co., June, 1938, *Jensen* s. n. (G); Juab, June, 1902, *Goodding* 1076 (G); mesa east of Monticello, July, 1911, *Rydberg & Garrett* 9203 (NY, US); Convulsion Canyon, Sevier Co., July, 1930, *Albertson* 41 (FS); south of Mexican Hat, June, 1930, *Goodman & Hitchcock* 1345 (G). ARIZONA: vicinity of Flagstaff, July, 1898, *MacDougal* 214 (G, NDA, NY). OREGON: Hurricane Creek, Wallowa Co., July, 1897, *Sheldon* 8628 (G, NY); Aug., 1898, *Cusick* 2104 (G); head of North Fork of Innaha River, Wallowa Co., July, 1928, *Reid* 738 (FS).

5b. Var. **cinerascens** (Rydb.),<sup>1</sup> comb. nov. *H. cinerascens* Rydb. in Mem. N. Y. Bot. Gard. **1**: 257 (1900); Coulter and Nelson, Man. Bot. Cent. Rky. Mts. 299 (1909); Rydb., Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. and Plains Cent. N. Am. 487 (1932). *H. canescens* Nuttall in T. & G., Fl. N. Am. **1**: 357 (1838), non *H. canescens* L., Sp. Pl. **2**: 748 (1873). *H. Macquenzii* f. *canescens* Fedtsch. in Acta Hort. Petrop. **19**: 274 (1902). *H. Macquenzii* v. *canescens* Fedtsch., ibid. in index p. 362.—Saskatchewan and Alberta to Wyoming. SASKATCHEWAN: Quappelle, June, 1879, *Macoun* s. n. (NY); Whiteshore Lake, Aug., 1906, *Macoun & Heriot* 70786 (NY); Bare Hills, Aug., 1906, *Macoun & Heriot* 70785 (G, NY); Moose Jaw, July, 1880, *Macoun* s. n. (G); without locality, 1858, *E. Bourgeau* s. n. (G, NY). ALBERTA: Cypress Hills, June, 1894, *Macoun* 4532 (G); Medicine Hat, May, 1894, *Macoun* 4531 (NY); Milk River Ridge, June, 1883, *Dawson* s. n. (G). WITHOUT DEFINITE LOCALITY: Lewis River, Rocky Mts., *Nuttall* (NY, ISOTYPE ?); Rocky Mts., *Nuttall* (G, ISOTYPE? possibly same as previous collection). MONTANA: Sec. 28, T. 10 N., R. 10 E., Jefferson Nat. For., June, 1925, *Bouham* 25 (FS); Yellowstone River, 1878, *Havard* s. n. (G); Midvale, July, 1903, *Umbach* 372 (NY, US); Lima, June, 1895, *Shear* 3363 (NY, US); June 29, 1895, *Rydberg* 2721 (NY);

<sup>1</sup> There is some question as to whether var. *canescens* Fedtschenko, though based on the illegitimate *H. canescens* Nuttall, should not take precedence over the combination I have made here, because of its possible priority in the varietal category. The fact that the combination *H. Macquenzii*, v. *canescens* was dubiously made only in the index of Fedtschenko's monograph, i. e., makes it almost imperative that the legitimate valid *H. cinerascens* be taken up in order to make the nomenclature of this variety definite and clear.

Livingston, 1901, *Scheuber* 222 (NY, US); Sixteen Mile Creek, July, 1883, *Scribner* 32 (G); Spanish Creek, Gallatin Co., June, 1901, *Vogel* s. n. (G); Park County, June, 1889, *Tweedy* s. n. (NY). WYOMING: Shirley Basin, Aug., 1908, *A. Nelson* 9179 (G, NY); Red Bank, Big Horn Co., July, 1901, *Goodding* 332 (G, NY, US); Headwaters of Tongue River, Big Horn Mts., July, 1898, *Tweedy* 132 (NY); Dayton-Kane Road, Sheridan Co., June, 1932, *Dickson* 250 (FS); Lower Blackrock, Teton Nat. For., *Rosencrans* 39 (FS).

5c. Var. **obovatum**, var. nov. Herba perennis argentea pubescentia; foliolis obovatis; pilis ca. 1.5 mm. longis.—Northern NEVADA: Thorpe Creek, east of Lamoille, Elko Co., Humboldt National Forest, July 25, 1928, *Harold H. Price* 168 (FS, TYPE).

5d. Var. **utahense** (Rydberg), comb. nov. *H. utahense* Rydberg in Bull. Torr. Bot. Club **34**: 424 (1907); Fl. Rky. Mts. adj. Plains 524 (1917); Tidestrom in Contrib. U. S. Nat. Herb. **25**: 333 (1925). *H. boreale*? sensu Durand. in Journ. Acad. Nat. Sci. Philad. **11**: 162 (1859), non Nuttall. *H. Mackenzii* sensu Watson, Bot. Fortieth Parallel 78 (1871), non Richardson.—Northern UTAH: Wasatch Mts., July, 1869, *Watson* 294 (G, NY); Fort Douglas, June, 1906, *Garrett* 1798 (G); May, 1908, *Clemens* s. n. (G); vicinity of Salt Lake City, May, 1883, *Leonard* 55 (NY, TYPE); Mt. Nebo, Aug., 1922, *Harris* c22402 (G); Ogden Canyon, July, 1902, *Pammel & Blackwood* 3705 (G); Rock Canyon, near Provo, June, 1925, *Garrett* 3324 (G); Lehi, May, 1916, *W. W. Jones* 170 (G); Salina Canyon, June, 1894, *M. E. Jones* 5319g (NY); Brigham, May, 1910, *Zundel* 193 (NY); between Linder and Pleasant Grove, Utah Co., June, 1917, *Eggleston* 13870 (US); South Sink, Garden City, Cache Nat. For., July, 1927, *Craddock* 20 (FS).

*H. boreale* has been widely misunderstood, possibly because of Nuttall's<sup>1</sup> own suggestion that his plant was "*H. alpinum* ? Mich. Fl. Am. **2**. p. 74." Apparently realizing his error, perhaps because he became familiar with the species of Michaux, Nuttall clarified his position by listing<sup>2</sup> one of Wyeth's specimens from the "sources of the Missouri" as "*Hedysarum boreale*, *H. Mackenzii* of Richardson, not *H. alpinum* of Michaux." Whatever led many authors, including Torrey and Gray,<sup>3</sup> Gray,<sup>4</sup> Britton and Brown<sup>5</sup> and Rydberg,<sup>6</sup> to apply the name *H. boreale* to one or

<sup>1</sup> Gen. N. Am. Pl. **2**: 110 (1818).

<sup>2</sup> Journ. Acad. Sci. Philad. **7**: 19 (1834).

<sup>3</sup> Fl. N. Am. **1**: 356 (1838).

<sup>4</sup> Man. Bot., ed. 2, 98 (1856).

<sup>5</sup> Ill. Fl. **2**: 392 (1913).

<sup>6</sup> Fl. Rky. Mts. adj. Plains 524 (1923).



another of the varieties of *H. alpinum* is not at present entirely clear. Several points brought out by Nuttall in his original description of *H. boreale* such as "stipules . . . subulate," "articulations of the loment . . . rugose," and "calix subulate" could hardly be applied to any of the American varieties of *H. alpinum*. Most suspicious of all, when one attempts to utilize the usual interpretation given in most floras and manuals, is Nuttall's statement of habitat "in arid and denudated soils around Fort Mandan, on the banks of the Missouri." Those familiar with the Fort Mandan region of North Dakota and the usual habitat for any of the varieties of *H. alpinum* are aware that no single species of *Hedysarum* is apt to be found in both habitats. Five collections of *Hedysarum* from North Dakota have been supplied by Dr. O. A. Stevens of the North Dakota Agricultural College for my study. All of these collections, one of which is from Dunn County in the Fort Mandan area, are the same species, *H. boreale*. In recent manuals plants comparable to these have been passing as *H. pabulare* and *H. cinerascens*, or in some instances as *H. Mackenzii*. Durand<sup>1</sup> long ago seems to have been on the right track as to the true identity of *H. boreale* when he noted that, "I cannot but consider *H. boreale* & *H. canescens* of Nuttall, and *H. Mackenzii* of Richardson, as forms of the same species, which it is impossible to separate."

*H. boreale* is one of those species with several recognizable varieties and numerous variants of less stable character. In several areas in its wide geographic range from Saskatchewan to Oklahoma and Arizona, trends of development are observable. Most prominent, perhaps, are those which have given rise to the large-flowered type found chiefly in northern Utah which Rydberg named *H. utahense* and the silvery-canescient type from northern Wyoming, Montana and adjacent southern Canada named *H. canescens* by Nuttall. Unfortunately, var. *obovatum* is not well enough known for its relationships with other varieties of *H. boreale* to be at all clear. Greene named another variant *H. carnosulum*, but the only points which are at all even measurably different from *H. boreale* var. *typicum* are the shorter stem-internodes and smaller leaves. These, it seems to me, are hardly sufficient to warrant keeping it up even in varietal rank.

<sup>1</sup> Journ. Acad. Sci. Philad. 11: 162 (1859).

Neither the original publication nor the type, if there be one, of *H. Roezlianum* have been available to me, but Fedtschenko<sup>1</sup> has reproduced Prantl's original diagnosis and notes in their entirety. The description is certainly that of a *Hedysarum* and, in my opinion, *H. boreale* or possibly one of its varieties. *H. Roezlianum* is based upon plants grown in the botanical garden of the University of Würzburg from seeds supplied by Rözl, who supposedly collected them in California. Since the genus *Hedysarum* is not known to occur in California and since Rözl is known to have traveled rather widely<sup>2</sup> in the Great Basin and Rocky Mountain regions, I think it is safe to assume that the seeds came from some locality in these areas.

6. *H. MACKENZII* Richardson. Perennial; stems several to numerous from a ligneous caudex, mostly simple above, terete, shallowly furrowed above, sparsely appressed-pubescent, 1–4 dm. high; stipules white-translucent with brown streaks, united, tips of the upper free; leaves petiolate, 4–8 cm. long; leaflets 4–6, oblong to broadly lanceolate or nearly elliptical, thick, glabrous to very sparsely pubescent and punctulate above, appressed-pubescent below, 15–25 mm. long, 4–10 mm. wide, obtuse to acute, not apiculate; inflorescence racemose, subcapitate; flowers 5–12, purple, erect but soon pendent, 18–21 mm. long; bracts subulate, pubescent, broadly scarious-margined; bracteoles linear, 2–3 mm. long; calyx villose, teeth linear-subulate, nearly equal, longer than tube, 3.5–6 mm. long; standard cuneate to broadly spatulate or nearly obovate, emarginate, 15–17 mm. long, 9–11 mm. wide; wings oblong, 14–16 mm. long, 3–4 mm. wide, claw broad, about 3 mm. long, wing-auricles blunt, rounded, free, about 1 mm. long; lomenta pendent to divaricately ascending, stipitate, 3–8-articled; articles nearly orbicular, not wing-margined, appressed-pubescent, 4–6 mm. wide, 5–8 mm. long, reticulations prominent, transversely elongated.—App. Franklin's Journ. 745 (1823); Hooker, Fl. Bor.-Am. 1: 155 (1834); Torrey and Gray, Fl. N. Am. 1: 357 (1838); Basiner in Mem. Acad. Sci. Petrop. 6: 58 (1846) in part; A. Nelson in Proc. Biol. Soc. Wash. 15: 184 (1902); Fedtschenko in Acta Hort. Petrop. 19: 273 (1902) in part; Henry, Fl. So. Brit. Columb. 192 (1915); Rydberg, Fl. Rky. Mts. adj. Plains 524 (1917); Fl. Pr. and Plains Cent. N. Am. 487 (1932) in part; Raup in Contrib. Arn. Arb. 6: 181 (1934); Bull. Nat. Mus. Can. 74: 148 (1935). *H. americanum Mackenzii* Britt. in Mem. Torr. Bot. Club. 5: 202 (1894). Newfoundland and Quebec; Manitoba and northwestward; also

<sup>1</sup> Acta Hort. Petrop. 19: 324 (1902).

<sup>2</sup> Garten- und Blumenzeit. Hamb. 422 (1874).

eastern Siberia. Without definite locality, presumably the Canadian Arctic, *Richardson* s. n. (G, ISOTYPE?). NEWFOUNDLAND: Green Gardens, Cape St. George, July, 1922, *Mackenzie & Griscom 11005 and 11053* (G). QUEBEC: Vaureal River, Anticosti Island, July, 1925, *Marie-Victorin et al. 20871* (G). MANITOBA: Churchill, Hudson Bay, July-Aug., 1910, *J. M. Macoun* (G). NORTHWEST TERRITORY: Chesterfield, Aug., 1933, *Gardner 434* (G); Bernard Harbour, Aug., 1915, *Johansen 331* (G). ALBERTA: Calgary, July, 1903, *Barber 211* (G); near Fortress Pass, July, 1927, *Ostheimer 82* (G); Ptarmigan Lakes and vicinity, July, 1906, *Brown 401* (G); Bow River Valley near Banff, June, 1906, *Brown 75* (G); head of Malique Lake, July, 1908, *Brown 1219* (G); 40-60 miles southwest of Banff, July-Aug., 1905, *Clark* s. n. (G); Mt. Temple, Laggan, July, 1907, *Butters & Holway 121* (G); between Salt Mt. and Junction Lake, June, 1928, *Raup 2802* (G). BRITISH COLUMBIA: Mt. Selwyn, July, 1932, *Raup & Abbe 3757* (G); vicinity of Hudson Hope, June, 1932, *Raup & Abbe 3603* (G); vicinity of the mouth of Wicked River, July, 1932, *Raup & Abbe 3854* (G); Burgess Trail near Field, July, 1906, *Brown 538* (G); Telegraph Creek, June, 1918, *Walker 1203* (G). YUKON TERRITORY: Herschel Island, Aug., 1934, *Dutilly 235* (G).

*H. Mackenzii* is a close relative of *H. boreale* Nutt. and might with some propriety be considered a variety of it, but there are some good reasons for keeping the two as separate species. *H. Mackenzii* is an arctic-alpine species which extends, interruptedly, from eastern Siberia to Newfoundland, and southward along the Rocky Mountains in western Canada. On the other hand, *H. boreale* is not a high-mountain species at all, but rather inhabits the low hills of the plains region of southern Canada and the western plains states together with the intermontane basins and lower mountain slopes of the Rocky Mountain Region. *H. Mackenzii* has fewer, larger, more brilliantly colored flowers and a more globular inflorescence than *H. boreale*, in which the flowers are a dull reddish-purple and disposed in an elongated raceme. On the whole, the two species differ considerably in habit and general aspect as well as in a number of technical characters which have been emphasized in the key. Considering the fact that *H. Mackenzii* and *H. alpinum* var. *americanum* (*H. americanum* Britt.) belong to two entirely different sections of the genus, it is almost incredible that Britton should have considered the two to belong to the same species. His combination



*H. americanum Mackenzii* must have been the result of a very hasty judgment.

PLATE 597. *HEDYSARUM GREMIALE* Rollins, sp. nov.: FIG. 1, ISOTYPE,  $\times 1/3$ , from 14 miles west of Vernal, Utah, *Rollins 1733*; FIG. 2, laments,  $\times 3$ ; FIG. 3, upper portion of inflorescence,  $\times 3$ .

## II. SOME SPERMATOPHYTES OF EASTERN NORTH AMERICA

M. L. FERNALD

(PLATES 598–625)

In an attempt to place the flora of the area covered by Gray's *Manual* upon a basis of greater precision it is found necessary to check the treatment of every genus and species. In the present paper notes which have accumulated during the past year are presented. In several cases nomenclatural transfers are necessitated by study of the actual types or of photographs of them purchased with aid of appropriations for research from the Department of Biology of Harvard University. The photographs of types of Linnean species have been received through the coöperation of Mr. Spencer Savage, Assistant Secretary of the Linnean Society of London, and of Dr. John Ramsbottom, Keeper of Botany at the British Museum of Natural History. For those of Lamarek, Desrousseaux and Michaux I am indebted to the always helpful Professor H. Humbert and M. R. Metman of the Muséum National d'Histoire Naturelle of Paris. To all these gentlemen I extend my grateful appreciation.

Some transfers are made from indefinite trinomials (published without clear statement of rank) or of plants originally described as subspecies. Most unfortunately, the term *subspecies*, clearly understood and correctly used by some of the most accurate of Old World systematists, has become debased and confused by a group of relatively inexperienced taxonomists (chiefly in this country) and its incorrect use is being urged by them, in the sense of the long-established term *varietas*. As correctly used the two are by no means of the same rank. The *subspecies* of the best taxonomists is a subdivision of an aggregate-species, *Gesamtart* or *species collectivus*, the subspecies often consisting of

geographic varieties ("races") and by many of us often treated as true species. A clear and concise statement of the true relation of these categories is contained in the Preface (p. vi.) to Hayek's splendidly clear *Prodromus Florae Peninsulae Balcanicae*, i. in Fedde, *Repert. Sp. Nov. Reg. Veg.* xxx<sup>1</sup>. (1924). This I reproduce:

- I. **Subspecies** . . . , i. e. formae valore systematico magno, quae plerumque facile distingui possunt, quarum origo communis autem formis intermediis vel alio modo patet.
- A. **Varietates** . . . , i. e. variationes valde distinctae distributione geographica propria.
- a) **Subvarietates** . . . , variationes similibus characteris ac priores sed aut constantia minore aut distributione geographica minus distincta
- a) formae
- . . . , variationes valoris systematici parvi, plerumque sine distributione geographica propria.

As an illustration we may look at Hayek's treatment of the cosmopolitan weed, *Stellaria media* (as it occurs in the Balkans). It is broken by him into three parallel subspecies: subsp. *eumedia*, *pallida* and *neglecta*. These differ in relatively fundamental characters, in which many systematists see true species: subsp. *eumedia* with outer sepals obtuse, petals about equaling calyx, stamens 3-5, styles recurved at apex, with forma *apetala* like it but apetalous; subsp. *pallida* with outer sepals lance-acuminate, petals minute or wanting, stamens 1-3, styles divaricate at base; and subsp. *neglecta*, a robust plant, with petals equaling or exceeding calyx, stamens 10. Subsp. *neglecta*, treated by many students as a good species, has two varieties: var. *macropetala* with stem pilose in lines, the petals longer than calyx; and var. *pubescens* with stem and peduncles densely viscid-puberulent, the petals equaling the densely pubescent sepals. Hayek correctly differentiated between subspecies and varieties. Another illustration of correct use of the terms is in Hackel's monograph of the *Andropogoneae* in DC. *Mon. Phan.* vi. (1889). Hackel (pp. 383-385) broke the familiar *Andropogon scoparius* Michx., which he considered an aggregate-species, into two subspecies: subsp. *a. genuinus* and subsp. *b. maritimus*. The former, including several subvarieties and forms, is the wide-ranging North American caespitose plant, with each fertile and sessile spikelet accompanied by a pair of plumose pedicels, the latter either with rudiments

or without; the second subspecies, subsp. *maritimus*, has each sessile spikelet accompanied by a single hairy pedicel which terminates in a well developed staminate spikelet. Hackel's *A. scoparius*, subsp. *maritimus* consisted of var. *α. genuinus*, which is *A. maritimus* Chapm., a low and stout stoloniferous plant with solitary culms and reflexed or divergent short leaves, found on the sandy coast of the Gulf of Mexico; and var. *β. divergens* (Anderss.) Hackel, based on a previously unpublished species, *A. divergens* Anderss. in herb., the latter a very tall plant forming dense stools, with prolonged slender ascending leaves, known only in pinelands of Texas. Nash, Hitchcock and all American students of grasses who correctly know these two plants treat them as perfectly distinct species, *A. maritimus* Chapm. and *A. divergens* Anderss. In other words, the term *subspecies*, correctly used by Hayek and by Hackel, covers a taxonomic concept of far greater value than the term *varietas*. A quite similar interpretation will be found to underlie the subspecies and varieties of those masters who have long correctly used these categories in botany; the term *subspecies*, correctly used, is of higher rank than the term variety (*varietas*) as used by the overwhelming majority of outstanding leaders in taxonomy from Linnaeus down. The substitution of the term *subspecies* for *varietas* has no justification in sound taxonomy of plants; and those who so substitute it not only cheapen and obscure the categories but give concrete evidence of a lack of familiarity with the best work in taxonomy.

I am quite aware that, taking their cue from the statement in *Philosophia Botanica*, some like to argue that Linnaeus used the term *varietas*, the subdivisions of species designated in his *Species Plantarum* by greek letters, only for garden "creations" and abnormalities. A little experience with *Species Plantarum* shows, however, the error of such a claim; an extended experience with the works of Linnaeus and his illustrious and wise associates and later editors shows that in actual practice he generally designated as varieties indigenous plants which he considered to be natural (often geographic) variations within the broad limits of his specific concept. The misconception of those who interpret the Linnean use of the term *varietas* by stressing the statement in *Philosophia Botanica*, rather than the actual prac-



tice of Linnaeus, has been well discussed by Ramsbottom in his Presidential Address before the Linnean Society of London, delivered at the 150th Anniversary Celebration in May, 1938. No more wholesome document, in these days of many confused and superficial ideas, can be recommended for the careful consideration of all taxonomists. I venture to quote briefly from this masterly address, *Linnaeus and the Species Concept*:

To return to 'Philosophia Botanica' we find that varieties are defined as in the 'Fundamenta' [1736], where Linnaeus had in mind chiefly what are now known as variations. There are as many varieties as there are different plants, produced from the seed of the same species. (Varietates tot sunt, quot differentes plantae ex ejusdem speciei semine sunt productae.) He adds that a variety is a plant changed by an accidental cause due to the climate, soil, heat, winds, etc. It is consequently reduced to its original form by a change of soil. (Varietas est Planta mutata a causa accidentali: Climate, Solo, Calore, Ventis, &c., reducitur itaque in Solo mutato.) Further, the kinds of varieties are size, abundance, crispation, colour, taste, smell. (Species varietatum sunt Magnitudo, Plenitudo, Crispatio, Color, Sapor, Odor.) Species and genera are regarded as always the work of Nature, but varieties as more usually owing to culture. (Naturae opus semper est Species & Genus; culturae saepius Varietas.) For that reason he would have ignored them in the general discussion of his ideas "published for the sake of my pupils," but that they often have economic, artistic, and medicinal uses.

But it is not reasonable to judge Linnaeus's ideas solely by his didactic 'Philosophia Botanica.' His greatest botanical work, his Golden Book, *maximum opus et aeternum*, is 'Species Plantarum,' published two years later. We know from his correspondence that he had been engaged upon the writing of this off and on for about nine years and consequently would not expect to find any departure from the definitions put forth in the 'Philosophia.' However, 'Philosophia Botanica' is precept, 'Species Plantarum' practice.

Perhaps equally striking is the treatment of varieties in 'Species Plantarum' when we bear in mind the definitions repeated two years previously. Far from being merely variations in non-essential characters, they are treated in the same way as species, and as may be seen from some of the quotations already given it is sometimes queried whether what is described as a species is only a variety or vice versa. Constancy is now one of the characteristics: thus var.  $\beta$ . (*fulvus*) of *Hemerocallis Lilio-Asphodelus* is described as "hybrida & constans," and the vars.  $\alpha$ . and  $\beta$ . of *Adonis annua* remain distinct.

How are we to regard this apparent change of view between 1751 and 1753? I think by denying that there had been one. That this is so is shown by the fact that his earlier writings contain similar notes. 'Hortus Cliffortianus,' 1737, is remarkably fully annotated and contains much of interest in showing the development of Linnaeus's ideas. Even here varieties are treated for the most part as permanent forms and

attached to their appropriate species (varietates ad species proprias reduxi).

'Flora Suecica' was published in 1745. Here again several species are regarded as related to others . . . or perhaps only varieties . . . ; an American *Pyrola* is regarded as a variety of a European species (ergo americana planta hujus varietas est.) Varieties may be inconstant . . . or constant as var.  $\beta$ . of *Alnus*.

Though it is obvious, therefore, that there was no change of view, we are still left with the problem of explaining the categorical statements in 'Philosophia Botanica.' Is not the explanation the simple one that this was a text-book, and that too much stress has been placed upon it both by Linnaeus's contemporaries and by those who thought that therein they had an epitome of his botanical philosophy? The series of aphorisms of 1736 were copied practically verbatim into 'Philosophia Botanica' years afterwards. . . . 'Philosophia Botanica,' remarkable as it is, suffered like many more modern text-books in being an enlarged second edition and as a students' book was concerned more with giving them a general account of certain aspects of botany at a stage where it was probably considered better to receive categorical statements than to wander into the realms of real philosophy.<sup>1</sup>

The modern fad of certain botanists, to substitute the heretofore clear term *subspecies*, erroneously used and often misunderstood by them, for the long established *varietas*, as used correctly for more than two centuries, is, as stated, a practice which cheapens the status of true subspecies and makes for inaccuracy and misunderstanding. As shown so clearly by Ramsbottom's analysis of Linnaeus's more scientific writings, it glorifies a text-book precept of 1736 and completely ignores the actual practice in *Hortus Cliffortianus*, *Flora Suecica* and "his greatest botanical work, his Golden Book, *maximum opus et aeternum* . . . 'Species Plantarum'."

Naturally, in a work dealing with all known plants Linnaeus had to recognize the innumerable garden products, such as the great series in *Brassica* or *Lactuca*, but he did so under strong protest: "Botanists differ from florists in their conception of varieties in this respect: that the former bestow varietal names by way of defining and expressing in words some unique characteristic in the variety: but the latter do reverence to the objects of their worship with names showing their devotion. . . . The objects of Botanists and Florists in regard to varieties are the same, but with this difference, that the Florist begins to play his part where the Botanist leaves off. . . . Hence the species of

<sup>1</sup> Ramsbottom in Journ. Linn. Soc. Lond. 150th Sess., especially pp. 199-205 (1938).

Botanists become the Classes of Florists, the Varieties of Botanists the Orders of Florists."<sup>1</sup> In spite of his inclusion of some horticultural products as varieties, a large proportion of the varieties actually recognized by Linnaeus in *Species Plantarum* are, as Ramsbottom points out, wild plants in nature with strong morphological or geographic differences, the varieties as maintained by the great majority of taxonomists for two centuries. A few from very many illustrations from ed. 1 (1753) are here given, selected as plants familiar to those who are intimate with the North American flora. *Circaea lutetiana* (European) had a var.  $\beta$ . *canadensis* (p. 9), which is the eastern North American *C. quadrisulcata* (Maxim.) Franch. & Sav., var. *canadensis* (L.) Hara in RHODORA, xli. 287 (1939). *Alopecurus geniculatus* (p. 60) had a var.  $\beta$ ., which is universally recognized as a distinct species, *A. aequalis* Sobol. *Juncus effusus* (p. 326) had a var.  $\alpha$ , "floribus sessilibus," which is the very distinct *J. arcticus* Willd. *Phytolacca americana* (p. 441) from Virginia had a Mexican variety  $\beta$ .; but in the 2d edition Linnaeus himself separated them as two species, *P. decandra* (Virginian) and *P. octandra* (Mexican) and everyone who understands them keeps them apart. *Magnolia virginiana* had 5 varieties:  $\alpha$ . *glauca*,  $\beta$ . *foetida*,  $\gamma$ . *grisea*,  $\delta$ . *tripetala*,  $\epsilon$ . *acuminata*; but in ed. 2 (1762) Linnaeus treated them, correctly, as species, *M. acuminata*, *tripetala*, etc. *Eupatorium purpureum* (p. 838) had a var.  $\beta$ ., which in ed. 2 became the species *E. maculatum* L. These and scores of other cases (in *Myosotis*, *Erythronium*, *Arenaria*, *Prunella*, *Thlaspi*, *Sisymbrium*, *Arum*, etc.) sufficiently indicate that in actual scientific practice Linnaeus by no means confined the term *varietas* to garden products and sports, but used it for native plants with such strong morphological and geographic isolation that, in many cases, his own later studies showed them to be true species.

I have never found myself able to join this modern group who base their thesis upon lack of clear understanding. I prefer to be a follower of the practice (not merely the text-book precept) of Linnaeus and of the tremendous army who by their clear understanding and painstaking studies have won lasting honor in the field of taxonomy: such outstanding scholars, who have

<sup>1</sup> Linnaeus, *Critica Botanica* (1737), transl. of Sir Arthur Hort, 190, 191 (1938).



correctly used the honorable old term *varietas*, to enumerate a few, as N. J. Andersson, Arnott, Ascherson, Babington, Bentham, Bertoloni, Blume, Blytt, Boissier, Boott, Alexander Braun, Robert Brown, Briquet, Buchenau, Bunge, Chamisso, Cogniaux, Cosson, Crépin, Decaisne, A. P. DeCandolle, Alphonse DeCandolle, Desfontaines, Desvaux, Dunal, Eichler, Endlicher, Engelmann, Engler, Fée, Fenzl, Fischer, Franchet, Fries, Gaertner, Garcke, Gaudin, Gay, C. C. Gmelin, C. F. Gmelin, S. C. Gmelin, Godet, Godron, Gray, Greene, Grenier, Grisebach, Hackel, Hemsley, Hillebrand, Hoffmann, J. D. Hooker, W. J. Hooker, Hornemann, Jacquin, Koch, Kunth, Lamarek, Lange, Ledebour, Lehmann, Lindley, Link, Loudon, Martius, Maximowicz, Meisner, Mertens, C. A. Meyer, Michaux, Miller, Moquin-Tandon, Johann Mueller, Nees, Nuttall, Palisot de Beauvois, Persoon, Poiret, Presl, Regel, Reichenbach, Roemer, Ruprecht, Sargent, Schimper, Schlechtendal, Schrader, Schultes (several), Sprengel, Swartz, Torrey, Trattinick, Trinius, Turczaninoff, Underwood, Urban, Ventenat, Warming, Watson, Wettstein and Willdenow.

The easy-going but often quite misleading practice of using trinomials without designation of rank, whether subspecies, variety, form or some other status, is an Americanism which does not reflect sound scholarship nor a desire to be quite clear to others. Those who thus avoid making their categories perfectly definite leave the burden of clarification to the unfortunate users of their work. It is not enough to say, like one author cited on a succeeding page, that "The trinomial in botany is usually referred to as a variety, although the designation subspecies would appear to be more reasonable." By thus "passing the buck," such authors automatically invite the outlawing of their names, for, as shown in the discussion of *Descurainia*, these names are not validly published by the International Rules of Botanical Nomenclature. Far from being definite the trinomial may be hopelessly indefinite. For instance, in his Working List of North American Pteridophyta (1901), the late B. D. Gilbert enumerated the variations of *Athyrium Filix-femina*, mostly on p. 15. He there had as no. 221 "f. *rubellum* f. nov. Gilbert," but in the Appendix where he described it (p. 35) it changed to *Athyrium filix-femina rubellum* Gilbert, with the statement three times made that it is

a variety, and the objectionable "var." definitely finding place in the discussion: "In var. *rubellum*" etc. Gilbert, evidently, was not sure whether he wanted to call the plant a forma or a variety, though in the second effort he did settle on "var." put into the discussion. The trinomial alone told nothing. How much better to be absolutely definite. The time taken and the clarity of mind necessary correctly to write the abbreviation are slight; the confusion created by its omission or by an explanation of the category hidden somewhere in explanatory text, which no author with generous attitude toward readers of various linguistic stocks should expect them to dig out, is enormous and enduring. As stated, authors who do not clearly designate the category to which their names belong are likely to have their combinations ignored.

POTAMOGETON BERCHTOLDI Fieber, var. **tenuissimus** (Mert. & Koch), comb. nov. *P. pusillus* L., var. *tenuissimus* Mert. & Koch in Röhling, Deutschl. Fl. i. 857 (1823).

P. BERCHTOLDI, var. **lacunatus** (Hagström), comb. nov. *P. lacunatus* Hagström, Crit. Researches Pot. 120, fig. 53 (1916).

P. BERCHTOLDI, var. **polyphyllus** (Morong), comb. nov. *P. pusillus*, var. *polyphyllus* Morong in Bot. Gaz. v. 51 (1880) and Mem. Torr. Bot. Cl. iii<sup>2</sup>. 46, excluding plant of Fresh Pond (1893).

P. BERCHTOLDI, var. **colpophilus** (Fernald), comb. nov. *P. pusillus*, var. *colpophilus* Fernald in Mem. Am. Acad. xvii. 90, t. 20, figs. d and e, and t. 35, fig. 5 (1932).

Ever since it was shown by Dandy & Taylor in Journ. Bot. lxxvi. 90-92 (1938), that the type of *Potamogeton pusillus* L. (1753) is really *P. panormitanus* Biv. (1838) and that the plant passing as *P. pusillus* must be called by the earliest available specific name, *P. Berchtoldi* Fieber (1838), American botanists, wishing to use the varietal names correctly, have awaited their transfer by the two English botanists. A letter to them sent long before the present war, inquiring if they proposed to make the transfers, having brought no reply and many students inquiring what they shall call the different varieties, there seems no discourtesy in getting them properly issued, that they may be available for use.

FIMBRISTYLIS **caroliniana** (Lam.), comb. nov. *Scirpus carolinianus* Lam. Illustr. i. 142 (1791). *S. puberulus* Michx. Fl., Bor.-

Am. i. 31 (1803). *Fimbristylis puberula* (Michx.) Vahl, Enum. ii. 289 (1806).

*Scirpus carolinianus* Lam., was collected in Carolina by Fraser. By *Index Kewensis* it is referred to the synonymy of *Fimbristylis castanea* (Michx.) Vahl, but the type, of which Professor Humbert and M. Metnán send me a very clear photograph, shows that the Lamareck species was the usually smaller *F. puberula*, with relatively small ellipsoid-ovoid spikelets. It is very well matched by the photograph published by me of typical *F. puberula* in RHODORA, xxxvii. t. 388, fig. 4; also by the type of *S. puberulus* Michx. (photograph before me) and by material from Petty's Island, Delaware River, New Jersey, October 27, 1866, C. F. Parker, by the Virginian specimens of Fernald & Long, nos. 3751 and 3746, by Wiegand & Manning, no. 553 from Robeson Co., North Carolina and Wiegand & Manning, no. 554 from Tallahassee, Florida. The following transfers are necessitated.

*F. CAROLINIANA*, forma **pycnostachya** (Fernald), comb. nov. *F. puberula*, forma *pycnostachya* Fernald in RHODORA, xxxvii. 396, t. 388, fig. 3 (1935).

*F. CAROLINIANA*, forma **eucycla** (Fernald), comb. nov. *F. puberula*, forma *eucycla* Fernald, l. c. figs. 1 and 2 (1935).

WHAT IS *ARISAEMA TRIPHYLLUM*? PLATES 598–600. Linnaeus in 1753 (Sp. Pl. 965) recognized a single American *Arum* with ternate leaves. This species, *Arum triphyllum*, was, however, a composite one, with two designated but unnamed varieties based upon earlier descriptions and figures, while the only specimen seen by Linnaeus himself was supposed to be the same as *Dracunculus sive Serpentaria triphylla Brassiliana*, in *Prod. descripta* of Bauhin, Pinax, 195 (1671). What the latter may have been is a problem, for in his *Prodromus* Bauhin gave a full description of *Serpentaria triphylla Brassiliana* with a roundish and 3-lobed (subrotundum, trifidum) leaf; spathe 5 inches long, dark purple, with white stripes, the spadix blackish, oblong and 2-cleft at tip (flos . . . longitudine unciarum quinq; atrorubens, striatus, venis albicantibus per medium, . . . pistillo nigricente, oblongo, in summo bifido). Furthermore, it was stated unequivocally to come from Brazil: "Ex Tououpinambault Brasiliæ anno 1614. allata."—Bauhin, Prodr. 101 (1671). In view



of the subrotund leaf and the bifid spadix, in addition to the source of the plant in Brazil, the single synonym given by Linnaeus for the Virginian *Arum acaule*, *foliis ternatis* of Gronovius, must have been erroneously associated with the Gronovian species. Linnaeus cited under the Brazilian reference the treatment of Dodart, *Memoires*, 81 (1676), and others have cited Dodart's remarkably clear plate. The latter, said to be *Dracunculus sive Serpentaria triphylla Brasiliana*, was drawn from a specimen secured from Canada! It is an excellent representation of the commonest form of the wide-ranging species which has been erroneously passing as *A. triphyllum* (var. *zebrinum* Sims); and it represents nothing Brazilian. Blume treated the reputed plant of Brazil as a distinct species, *Arisaema brasilianum* Blume, *Rumphia*, i. 96 (1835), but he added nothing definitely clarifying its identity. In *Flora Brasiliensis*, iii<sup>2</sup>. 47 (1878) Engler explicitly states that "Tribus V. AREAE Engl. cum subtribubus 1) ARISARINAE Schott (gen. *Arisarum* . . . , *Arisaema* Mart., *Pinella* Ten.) . . . omnino extra-brasiliensis est"; and in 1879 (*Araceae* in *DC. Mon.* i. 534) Engler definitely reduced *Arisaema brasilianum* to the aggregate eastern North American species. In view of the confusion, however, as to *A. brasilianum*, based upon a reputed Brazilian plant, it is wisest not to consider *Dracunculus sive Serpentaria triphylla Brasiliana*, at least of Bauhin, as a primary basis of *Arum triphyllum* L. In order that the Linnean treatment may be clearly understood it is here reproduced.

4. A R U M acaule, foliis ternatis. *Gron. virg.* 113. *triphyllum*.  
*Dracunculus* s. *Serpentaria triphylla brasiliana*. *Bauh.*  
*pin.* 195. *prodr.* 101. *Dod. mem.* 81.
- β. *Arum minus triphyllum* s. *Arisarum*, pene viridi,  
*virginianum*. *Moris. hist.* 3. p. 547. s. 13. t. 5. f. 43.
- γ. *Arum* s. *Arisarum triphyllum minus*, pene atrorubente,  
*virginianum*. *Pluk. alm.* 52. t. 77. f. 5.  
*Habitat in Virginia, Brasilia.* 24.  
*Plantae brasilianae foliola lateralia extrorsum lobata, virginiae autem tantum, gibba, eandem tamen suadet Floris structura.*

It will be seen that the single unequivocal basis of true *Arum triphyllum* L. was the Gronovian *Arum acaule*, *foliis ternatis*. It is important, therefore, that a specimen of this plant, which Linnaeus had in his own herbarium prior to 1753 and which he



Photo. H. G. Fernald.

ARISAEMA TRIPHYLLUM: FIG. 1. TYPE (leaf and smaller spathe),  $\times 1$ , of ARUM TRIPHYLLUM L.; FIG. 2. spathe, laid open,  $\times 1$ , from type-region, Virginia; FIG. 5. seeds,  $\times 5$ , from Virginia.

A. TRIPHYLLUM, forma PUSILLUM: FIG. 3. spathe, laid open,  $\times 1$ , from New Jersey.

A. TRIPHYLLUM, var. ACUMINATUM: FIG. 4. spathe, laid open,  $\times 1$ , from Florida.



Photo. H. G. Fernald.

ARISAEMA ATRORUBENS: FIG. 1, spathe, laid open,  $\times 1$ , from Maine; FIG. 4, seeds,  $\times 5$ , from Pennsylvania.

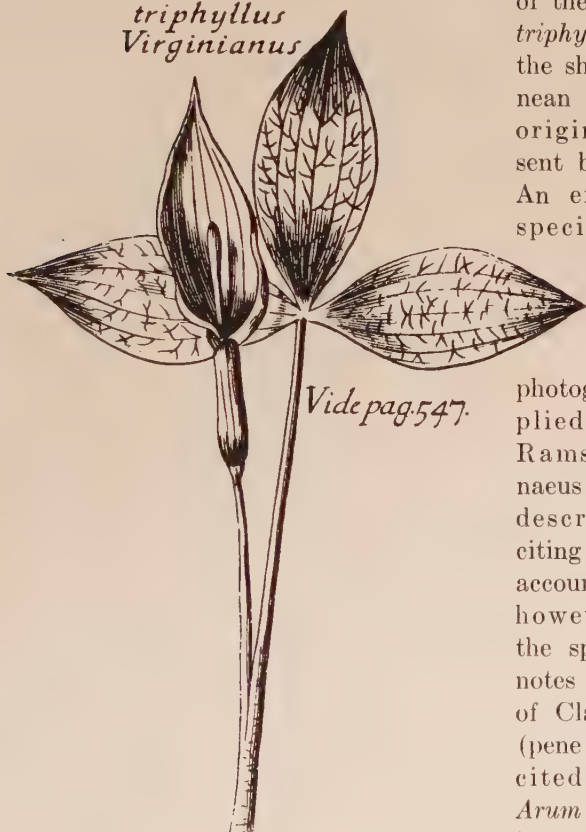
A. ATRORUBENS, forma ZEBRINUM: FIG. 2, spathe, laid open,  $\times 1$ , from Virginia.

A. ATRORUBENS, forma VIRIDE: FIG. 3, spathe, laid open,  $\times 1$ , from South Carolina.



marked "4. *triphyllum*," consequently the TYPE of the species, is the green-spathed form of *Arisaema pusillum* (Peck) Nash in Britton, Man. 229 (1901), based on *A. triphyllum*, var. *pusillum* Peck, N. Y. State Mus. Rep. li. 297 (1898). PLATE 598, FIG. 1,

43. *Arum triphyllum* f. *sive*  
*Dracunculus*  
*triphyllus*  
*Virginianus*



TEXT-FIG. 1. Morrison's figure of *Arum triphyllum*.

shows the leaf and one of the spathes of the TYPE of *Arum triphyllum*,  $\times 1$ , from the sheet in the Linnean Herbarium, the original photograph sent by Mr. Savage. An exactly similar specimen is in the

Gronovian Herbarium at the British Museum, a

photograph of it supplied through Dr. Ramsbottom. Linnaeus gave no original description, merely citing the Gronovian account. Gronovius, however, described the spadix from the notes of Banister and of Clayton as green (pene viridi) and he cited as identical *Arum minus triphyllum* s. *Arisarum pene viridi Virginianum* of Morison's *Plantarum*

*Historiae Oxonensis*, iii. sect. xiii. 547, no. 44, t. 5. fig. 43 (1715). This is the reference given by Linnaeus as the sole basis of his *Arum triphyllum*,  $\beta.$ , and Morison's plate 5, fig. 43 shows a plant (our text-figure 1) readily referable to *Arisaema pusil-*

lum. It should be noted, however, that in the text (p. 547) Morison cites no figure under his no. 44, *Arum minus triphyllum sive Arisarum pene viridi Virginianum*, but the plate was cited by him under his no. 43, *Arum triphyllum Virginianum flore pallido, pistillo atrorubente*, although on the plate he called it *Arum triphyllum sive Dracunculus triphyllus Virginianus*, thus introducing a confusion which I do not attempt to clear. The main point is, that, regardless of early literary confusions, the actual TYPE of *Arum triphyllum* must be taken as the plant which Linnaeus had before him (our PLATE 598, FIG. 1).

Until 1901, when both *Arisaema pusillum* (Peck) Nash (our PLATE 598, FIG. 3) and *A. Stewardsonii* Britton (our PLATE 600, FIG. 4) were put forward as species, botanists generally supposed that we had in temperate eastern North America a single polymorphous species, to which several specific names had been needlessly given. So far as I can determine *A. Stewardsonii* has a clear title; the identity of *A. pusillum* as true *A. triphyllum* has been discussed. There remains the hope that one of the earlier names may clearly belong to the species (PLATE 599) which has generally passed as *A. triphyllum*, the plant with leaves glaucous and dull beneath (when fresh), the lateral leaflets strongly rounded on the lower side, the horizontally rounded summit of the spathe-tube with a flange 2–8 mm. broad, the broadly oblong-ovate abruptly acuminate hood 3–6 cm. broad, the fruiting head 3–6 cm. long, the depressed-globose or reniform seeds deeply invaginated at base. This is the common and often rather coarse species of rich woods and thickets from New Brunswick and adjacent Quebec to southeastern Manitoba, south to South Carolina, Tennessee, Missouri and eastern Texas. Its hood varies from purple to green, often with pale longitudinal stripes.

Contrasting with the wide-ranging and inland plant which erroneously passes as *Arisaema triphyllum*, true *A. triphyllum* (*A. pusillum*) is usually smaller (PLATE 598); its leaves are green and lustrous beneath, the lateral leaflets acute at base; the flange at the summit of the spathe-tube is narrow (0.5–2 mm. wide); the narrowly oblong to lance-ovate attenuate hood is only 2–3 cm. broad and solidly green or solidly purple on the inner face, without pale stripes above the base; the fruiting heads are only 1.5–2 cm. long; the obovoid seeds stipitate and not clearly in-

vaginated at base. This is a plant of the southern Coastal Plain and Piedmont, occurring in wet woods and about spring-heads from Florida to Kentucky, northward to southeastern New York, Connecticut and southeastern Massachusetts.

*Arisaema Stewardsonii* (PLATE 600, FIG. 4) in the fresh material is strikingly different. Its tuber frequently sets off stolons or stalked plantlets; its foliage is similar to that of the preceding species, but its spathe has the inrolled tube sharply and deeply corrugated with white ridges (corrugations disappearing in drying), green or purple, the summit tapering gradually into the narrowly ovate (2–6 cm. broad) attenuate green to purple hood; fruiting head 2.5–3.5 cm. long; seeds as in *A. triphyllum* (*pusillum*). *A. Stewardsonii* is a plant of wet or swampy woods and thickets from Nova Scotia and Prince Edward Island to Minnesota, south to northern New Jersey and Pennsylvania.

Returning to the species with fresh foliage glaucous beneath, the lateral leaflets rounded at base, the spathe with smooth tube and horizontally rounded broad-flanged summit, several early names seem to belong to it. It was, probably, the *Arum* s. *Arisarum triphyllum minus, pene atrorubente, virginianum* of Plukenet, *Almagestum*, 52, t. 77, fig. 5; therefore, as the only cited plant, *Arum triphyllum*,  $\gamma$ . of L. Sp. Pl. 965 (1753). Plukenet's description is very brief and quite inconclusive and his figure is very far from satisfactory. It might have been conventionalized from a specimen of the glaucous-leaved plant. The first reasonably clear name for this species is *Arum atrorubens* Ait. Hort. Kew. iii. 315 (1789). Aiton recognized two North American species: *A. triphyllum*, described quite correctly (in the sense of the Linnean type) "foliis ternatis, lamina lanceolata acuminata"; and the new *A. atrorubens* "lamina ovata," cultivated from Virginia by Philip Miller in 1758. Aiton, to be sure, took his specific name from the not wholly definite *Arum* s. *Arisarum triphyllum minus, pene atrorubente virginianum* of Plukenet (see above); but since Aiton had fresh material with *ovate* (as contrasted with lance-acuminate) leaflets, his name may be accepted. Unfortunately, Mr. Weatherby, who sought, when in England, for Aiton's type, could find nothing to stand for his species. I am, however, adopting for the plant which has recently passed as *Arisaema triphyllum* the name *A. atrorubens*.



(Ait.) Blume, Rumphia, i. 97 (1835). Its identity is reasonably certain.

Both *Arisaema triphyllum* and *A. atropurpureum* vary greatly in the color of the spathes. These color-forms have mostly been named as varieties. In so far as I can identify the old names I have taken them up. The bibliography of the two long confused species follows.

**ARISAEMA TRIPHYLLUM** (L.) Schott in Schott & Endlicher, Meletemata, i. 17 (1832). *Arum triphyllum* L. Sp. Pl. ii. 965 (1753) as to TYPE. *Arum triphyllum*,  $\beta$ . *viride* Sims, Bot. Mag. sub. t. 950 (1806), based on Morison's plate. *Arisaema pusillum* (Peck) Nash, forma *pallidum* E. H. Eames in RHODORA, xxxiii. 168 (1931).—Hood of spathe and tip of spadix green. PLATE 598, FIGS. 1 and 2.

Forma **pusillum** (Peck), comb. nov. *A. triphyllum*, var. *pusillum* Peck in N. Y. State Mus. Rep. li. 297 (1898). *A. pusillum* (Peck) Nash in Britton, Man. 229 (1901).—Hood full purple-brown on inner face. PLATE 598, FIG. 3.

**A. ATROPURPUREUM** (Ait.) Blume, Rumphia, i. 97 (1835). *Arum atropurpureum* Ait. Hort. Kew. iii. 315 (1789). *A. triphyllum*,  $\beta$ . *atropurpureum* Michx. Fl. Bor.-Am. ii. 188 (1803), probably (type not seen). *A. triphyllum* sensu recent Am. auth., not (L.) Schott.—Hood purple, without pale stripes. PLATE 599, FIG. 1.

Forma **zebrinum** (Sims), comb. nov. *Arum triphyllum*,  $\alpha$ . *zebrinum* Sims, Bot. Mag. t. 950 (1806). *A. hastata* Blume, Rumphia, i. 96 (1835), plant with hastate-lobed leaflets.—Hood purple or bronze within, purple to greenish without, with long pale stripes on inner face. PLATE 599, FIG. 2.

Forma **viride** (Engler), comb. nov. *Arum triphyllum*, var.  $\beta$ . *virens* Michx. Fl. Bor.-Am. ii. 188 (1803), photograph of type in Gray Herb. *Arisaema atropurpureum*,  $\beta$ . *viride* Engler in DC. Monogr. i. 536 (1879). *Aris. triphyllum*, var. *viride* (Engler) Engler, Pflanzenr. iv<sup>23f</sup>. 200 (1920). *Aris. triph.*, forma *viride* (Engler) Farwell (as *vivide*) in Am. Midl. Nat. xi. 50 (1928), xii. 53 (1930).—Spathe green, without or with only faint stripes. PLATE 599, FIG. 3.

In order to clarify the identities I am showing characteristic spathes of the different species and forms laid out to show the summit of the sheath and the flange at the junction of sheath and hood, in each case,  $\times$  1.

In PLATE 598, FIG. 2 is the spathe of *A. triphyllum* from Great Neck, Princess Anne County, Virginia. Fernald & Griscom, no. 4351, plant identified by Mr. C. A. Weatherby with the original Clayton material; fig. 3, *A. triphyllum*, forma *pusillum* from Chestnut Neck, Mullica River, Port Republic, Atlantic County, New Jersey, B. Long, no. 12,064. PLATE 599,

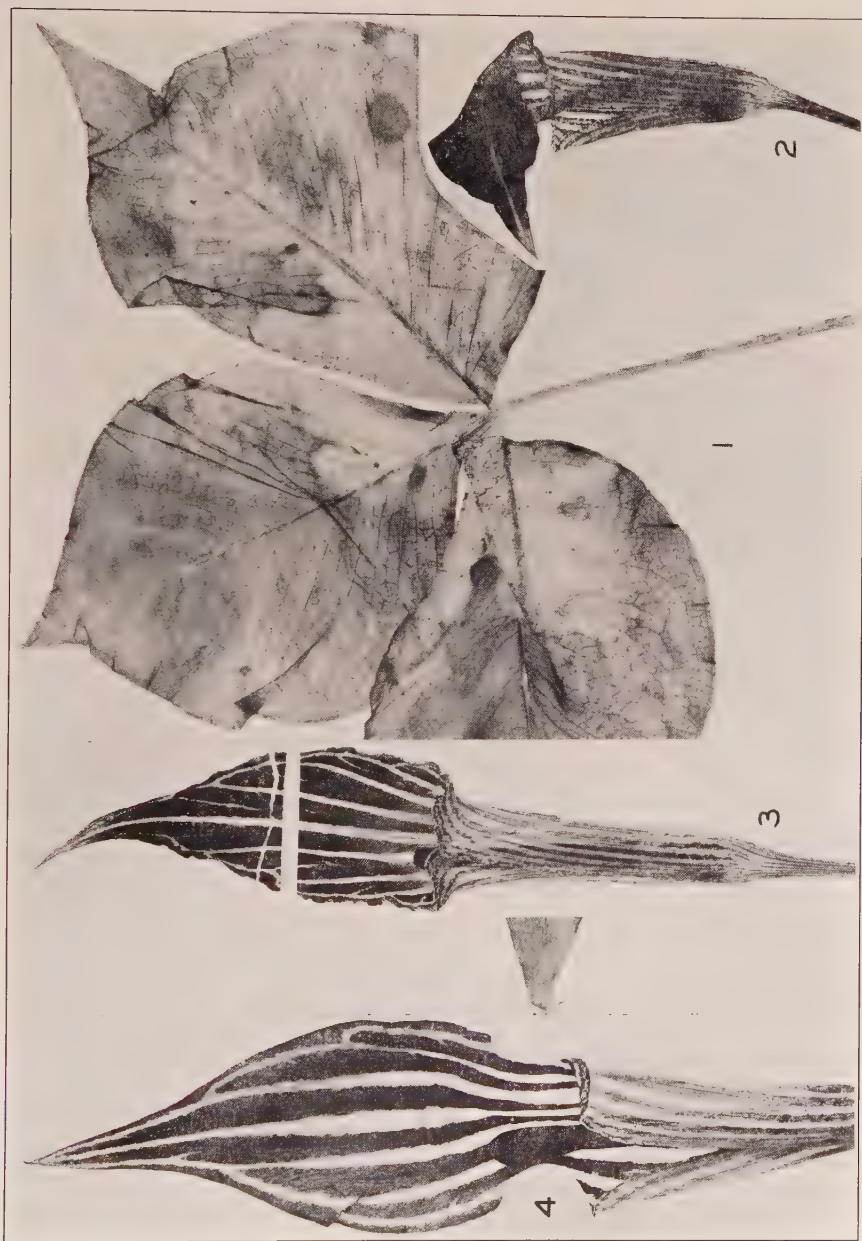


Photo. H. G. Fernald.

ARISAEMA TRIPHYLLUM, var. MONTANUM: FIGS. 1 and 2, leaf and spathe,  $\times 1$ , from the TYPE; FIG. 3, spathe, laid open,  $\times 1$ , from North Carolina.

A. STEWARDSONII: FIG. 4, spathe, laid open,  $\times 1$ , from Pennsylvania.



Fig. 1. Type of MELANTHIUM DENSUM Desv.,  $\times \frac{1}{2}$ .  
Fig. 2. Type of HELONIAS ANGUSTIFOLIUS Michx.,  $\times \frac{1}{2}$ .



FIG. 1, is *A. atrorubens* from Hartford, Maine, *Parlin*, no. 2089; FIG. 2, *A. atrorubens*, forma *zebrinum* from southeast of Hopewell, Prince George County, Virginia, *Fernald & Long*, no. 9702; FIG. 3, *A. atrorubens*, forma *viride*, from Myrtle Beach, Horry County, South Carolina, *Weatherby & Griscom*, no. 16,469. PLATE 600, FIG. 4, is *A. Stewardsonii* Britton from Little Mud Pond, 4 miles northeast of Porter's Lake, Pike County, Pennsylvania, *Fogg*, no. 10,732. The seeds of *A. triphyllum*,  $\times 5$ , are shown in PLATE 598, FIG. 5, these from Little Neck, Princess Anne County, Virginia, *Fernald & Long*, no. 3822; characteristic seeds,  $\times 5$ , of *A. atrorubens* from south of Milltown, Chester County, Pennsylvania, *Adams & Tash*, no. 558, are shown in PLATE 599, FIG. 4.

Two southern plants, *Arisaema quinatum* (Nutt.) Schott, with mostly quinate leaves and *A. acuminatum* Small, should be noted. The former is apparently only a frequent phase of *A. atrorubens* which often has the lateral leaflets lobed; while *A. acuminatum* (PLATE 598, FIG. 4) shows nothing but great size to separate it from typical *A. triphyllum*. The stalked obovoid seeds are too similar. I am leaving it as *A. triphyllum*, var. *acuminatum* (Small) Engler but gigantic plants of more northern *A. triphyllum* (rarely collected because of their great size) suggest that var. *acuminatum* is likely to prove of no taxonomic importance. The characteristic spathe, FIG. 4, is from Duval County, Florida, *A. H. Curtiss*, no. 2681.

Typically *Arisaema triphyllum* has the leaflets quite green on both sides, the relatively narrow leaflets attenuate or acuminate at both ends, the hood solidly colored (greenish or dark purple) and without clear striping. On the Cumberland Plateau of Tennessee and in western North Carolina there is an anomalous plant, with relatively broad and strongly rounded leaflets glaucous beneath, the spathe as in *A. triphyllum*, forma *pusillum*, except that it is clearly striped. In its extreme it is very definite, but one collection from Biltmore, North Carolina, with broadly rounded leaflets, has the solidly purple hood of forma *pusillum*. I am, therefore, treating the extreme plant as a variety because of its three characters. Further material may necessitate another disposition of it. I call it

ARISAEMA TRIPHYLLUM (L.) Schott, var. **montanum**, var. nov. (TAB. 600, FIG. 1-3), foliolis late obovatis vel ovatis apice subulato-aristatis subtus glaucis; spathe laminis intus purpurascens valde pallide striato-vittatis.—TENNESSEE: rocky slope at Caney Creek Falls, alt. 1200 feet, May 13, 1934, *E. B. Harger*, no. 7745 (TYPE in Herb. Gray.). NORTH CAROLINA: deep and rich woods, Biltmore, May 15, 1897, *Biltmore Herb.*, no. 1288<sup>b</sup>.

IN PLATE 600, FIG. 1 shows a characteristic leaf and FIG. 2, a spathe,  $\times 1$ , of the TYPE; FIG. 3 a spathe opened out,  $\times 1$ , of Biltmore no. 1288<sup>b</sup>.

ZIGADENUS **densus** (Desr.), comb. nov. *Melanthium densum* Desr. in Lam. Encycl. iv. 26 (1796). *Helonias angustifolius* Michx. Fl. Bor.-Am. i. 212 (1803). *Amianthium angustifolium* (Michx.) Gray in Ann. Lyc. N. Y. iv. 121 (1848). *Z. angustifolius* (Michx.) Wats. in Proc. Am. Acad. xiv. 280 (1879). *Tracyanthus angustifolius* (Michx.) Small, Fl. Se. U. S. 251, 1328 (1903).

Desrousseaux thought that his new *Melanthium densum* might perhaps be the same as *Veratrum luteum* L. and gave the latter as a doubtful synonym. Consequently, later authors, including *Index Kewensis*, have assumed without examining Desrousseaux's material or detailed description that his *M. densum* is *Chamaelirium*. Desrousseaux's material, in Lamareck's herbarium, was collected in Carolina by Fraser. Its inflorescence,  $\times \frac{1}{2}$ , is shown in PLATE 601, FIG. 1. FIG. 2 is Michaux's type, also  $\times \frac{1}{2}$ , of *Helonias angustifolius*. That they are the same there can be no question.

STELLARIA CALYCANTHA (Ledeb.) Bongard, var. **laurentiana**, var. nov. (TAB. 602, FIG. 1 et 4), caulibus crassis 1–2 mm. diametro 3–5 dm. altis; foliis lanceolatis, primariis 3–7 cm. longis 5–11 mm. latis; pedunculis valde elongatis, imis 2–4 cm. longis, maturis adscendentibus; calycibus 4.5–5 mm. longis; capsulis maturis 5–6 mm. longis; stylis 1.3–1.6 mm. longis; seminibus 0.7–0.9 mm. longis.—QUEBEC: Anticosti Island, *Pursh*; Baie St. Claire, Anticosti, August 19, 1917, *Victorin*, no. 4219 (as *Moehringia macrophylla*); calcareous sea-cliffs and rock-slides by Gulf of St. Lawrence, Christie, Gaspé County, July 25, 1922, *Fernald & Pease*, no. 25,058 (TYPE in Herb. Gray); damp cold ledges, Baie Orignal, Bic, Rimouski County, June 27, 1905, *F. F. Forbes*.

Differing from the other eastern American variations of *Stellaria calycantha* (discussed below) in the great size of all its parts; our other eastern plants, true *S. calycantha* (*S. borealis* Bigel.) and its vars. *isophylla* and *floribunda*, having usually smaller leaves, mature calyx 2–3.5 (rarely –4) mm. long, mature capsules 3–5 mm. long, shorter styles and smaller seeds. Var. *laurentiana* was mistaken by me in RHODORA, xvi. 151 (1914) for the Pacific American *S. borealis* (or *calycantha*), var. *Bongardiana* Fernald, which has similarly long calyx, capsule, styles

and seeds, but in maturity has the fruiting peduncles abruptly reflexed from the base.

The probable necessity to take up for the familiar *Stellaria borealis* the less known name *S. calycantha* makes it unfortunately necessary to transfer several varietal names and also to evaluate the characters recently emphasized in the group. In order that the situation may be clear it is important to illustrate the various points by photographs taken by Mr. Hodge. The transfers follow.

*S. CALYCANTHA*, var. **Simcoei** (Howell), comb. nov. *Alsine Simcoei* Howell, Fl. Nw. Am. i. 83 (1897). *S. borealis*, var. *Simcoei* (Howell) Fernald in RHODORA, xvi. 150 (1914).

*S. CALYCANTHA*, var. **isophylla** (Fernald), comb. nov. *S. borealis*, var. *isophylla* Fernald, l. c. (1914). PLATE 602, FIG. 2; PL. 603, FIG. 4.

*S. CALYCANTHA*, var. **floribunda** (Fernald), comb. nov. *S. borealis*, var. *floribunda* Fernald, l. c. 151 (1914). PLATE 603, FIG. 2.

*S. CALYCANTHA*, var. **Bongardiana** (Fernald), comb. nov. *S. borealis*, var. *Bongardiana* Fernald, l. c. (1914). *S. sitchana* Steud., var. *Bongardiana* (as *Bongardia*) (Fernald) Hultén, Fl. Aleut. Isl. 165 (1937). PLATE 602, FIG. 3.

*S. CALYCANTHA*, var. **sitchana** (Steud.), comb. nov. *S. sitchana* Steud. Nom. ed. 2, ii. 637 (1841). *S. borealis*, var. *sitchana* (Steud.) Fernald, l. c. (1914). PLATE 602, FIG. 5; PL. 603, FIGS. 1 and 3.

Fenzl,<sup>1</sup> to whose judgment in the *Caryophyllaceae* everyone defers, had reduced *Stellaria borealis* Bigel. to *S. calycantha* (Ledeb.) Bongard, based upon *Arenaria calycantha* Ledeb. (1812) and, therefore, with a specific name older than *S. borealis* Bigel. (1824); and there was special significance in the fact that Ledebour's species was thus disposed of by Fenzl in Ledebour's Flora Rossica. When, however, in 1914 I doubted this identity and stood by the clearly described *S. borealis* Bigel., I based my skepticism upon the original diagnosis of *Arenaria calycantha* Ledeb. in Mém. de l'Acad. Sci. St. Pétersb. v. 534 (1812). Ledebour, along with Boissier, Schlechtendal, Bigelow and Torrey, stands out as one of the most accurate phytographers of his time. I, therefore, disliked to take up for *S. borealis*, with erect flowers on naked peduncles, the name given by Ledebour, for his

<sup>1</sup> Fenzl in Ledebour, Fl. Ross. i. 382 (1841).



*Arenaria calycantha* from Siberia was described with "pedunculis . . . diphyllis" or again "Pedunculi supra medium diphylli . . . Flores nutantes, interdum bractea ovata." Dr. Eric Hultén, however, in his *Flora of Kamtchatka*, ii. 64 (1928) unequivocally states that "the type-specimen in Hb. Hort. Petrop. of *Arenaria calycantha* LEDEB. which I have seen is identical with our plant [*S. borealis*], and it must therefore bear the name *Stellaria calycantha*." There is, consequently, no course, assuming that the plant Hultén examined was the actual type and that he correctly understood the characters of *S. borealis*, but to take up the very imperfectly described *S. calycantha*.

To this extent I am following him (and before him, Fenzl and Ledebour), with the reservation that a good photograph of the type, when it can be secured, may change the interpretation; but I cannot follow him when he says: "Fernald . . . includes as varieties under *S. borealis* BIGEL. several forms which in my opinion represent distinct species" (p. 61). In his *Flora of the Aleutian Islands*, 164, 165 (1937), Hultén treats *S. sitchana* (*S. calycantha*, var. *sitchana*), with *S. sitchana*, var. *Bongardiana* (Fernald) Hultén, but misspelled *Bongardia* (*S. calycantha*, var. *Bongardiana*), as a species quite distinct from *S. calycantha* (*S. borealis*), quoting the characters I had used for them as varieties (merely the overlapping differences in length of calyx and capsule), to which he added "other characteristics"—"the styles are about twice as long (often broken on herbarium specimens), the stem is distinctly quadrangular and scabrous, especially on the edges, and, in many cases at least, short petals are developed. *S. calycantha* has a smooth, not quadrangular stem and no petals. As, furthermore, Fernald's varieties have a geographical area of their own and in general appearance differ considerably from typical *S. calycantha*, I think they together form a separate species."

As to the general appearance which Hultén finds to "differ considerably," PLATE 602, FIG. 2, shows the upper part of one of the type specimens,  $\times 1$ , of *S. calycantha*, var. *isophylla* (from New Hampshire), with sepals 2–3.5 mm. long; FIG. 3 is from the upper half of a specimen,  $\times 1$ , of var. *Bongardiana* from Atka Island (Dall), cited by Hultén and labeled by him as *S. sitchana*, var. *Bongardiana*. The difference in appearance does not seem

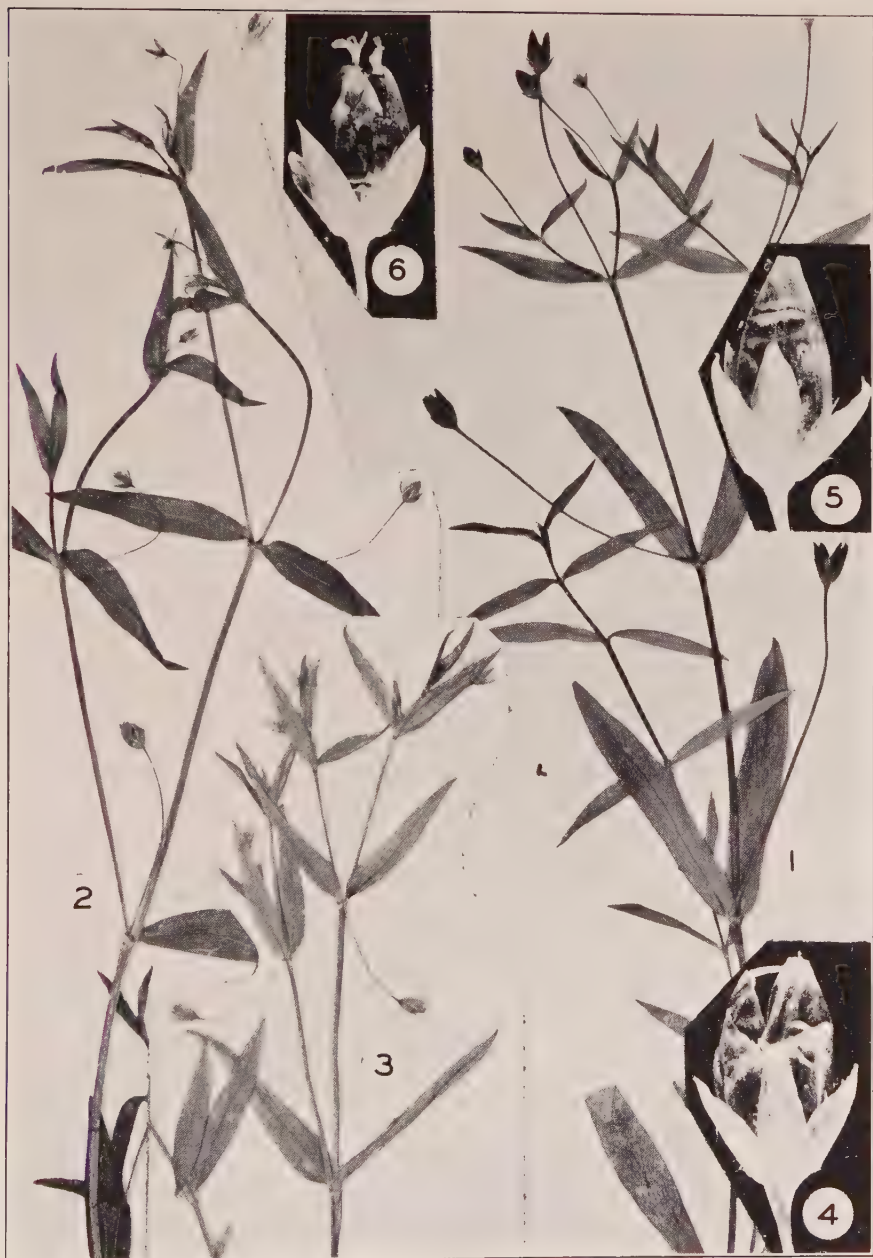


Photo. W. H. Hodge.

*STELLARIA CALYCANTHA* (*S. borealis*): FIG. 6, fruiting calyx,  $\times 5$ , from White Mountains, New Hampshire (type-region of *S. borealis*).

Var. *LAURENTIANA*: FIG. 1, portion of TYPE,  $\times 1$ ; FIG. 4, fruiting calyx,  $\times 5$ , from Anticosti.

Var. *ISOPHYLLA*: FIG. 2, portion of TYPE,  $\times 1$ .

Var. *BONGARDIANA*: FIG. 3, portion of plant,  $\times 1$ , from Atka Island, Alaska.

Var. *SITCHANA*: FIG. 5, fruiting calyx,  $\times 5$ , from Wrangel, Alaska.



Photo. W. H. Hodge.

STELLARIA CALYCANTHA, var. SITCHANA: FIG. 1, portions of plant,  $\times 1$ , from Oregon;  
FIG. 3, portion of stem,  $\times 10$ , from Wrangel, Alaska.

Var. FLORIBUNDA: FIG. 2, portion of plant,  $\times 1$ , from Ontario.

Var. ISOPHYLLA: FIG. 4, portion of stem,  $\times 10$ , from New York.



to me specific. PLATE 603, FIG. 1, is a specimen,  $\times 1$ , of the reputed species, *S. sitchana*, from Oregon (*Sheldon*, no. 8241); FIG. 2 a specimen,  $\times 1$ , of *S. calycantha*, var. *floribunda* from near Lake Superior (*John Macoun*). I fail to get the specific dissimilarity in appearance, except that the mature fruiting peduncles of the former are more generally (but not always) reflexed than in the latter. PLATE 602, FIG. 4, shows a mature calyx and capsule,  $\times 5$ , from an Anticasti (*Victorin*) specimen of the eastern *S. calycantha*, var. *laurentiana*; PLATE 602, FIG. 5, is a mature calyx and capsule, also  $\times 5$ , from Alaskan var. *sitchana* (*Wrangel*, July 22, 1891, *Cooley*). The differences are not striking. Nor do the calyx and capsule,  $\times 5$  (FIG. 6), of *S. calycantha* from the White Mountains (type area of *S. borealis*) show any appreciable difference except in size, FIG. 6 from Ice Gulch, Randolph, New Hampshire, September 2, 1890 (*Churchill*).

If, as *Hultén* asserts, the type of *Stellaria calycantha* "is identical with our plant [*S. borealis*]" and if, as he also states, the wide-ranging *S. calycantha*, with relatively short calyx, capsule and styles, differs from the more localized and larger-flowered *S. sitchana* by having a "smooth, not quadrangular stem and no petals," it is most remarkable that that master of accurate observation and description, *Jacob Bigelow*, should, in his original description of *S. borealis* from the White Mts. of New Hampshire, have defined his new species as having "Stem . . . angular . . . Petals white, deeply cloven" (*Bigelow*, Fl. Bost. ed. 2; 182); that, still earlier, *André Michaux*, getting one of the narrow-leaved varieties (*S. calycantha*, var. *floribunda*) of the small-flowered series "in borealibus Americae septentrionalis" (which, as shown in his herbarium at Paris, meant Lake Mistassini and the Saguenay River), should have described it, as his *Spergularium lanceolatum*, "floribus petaliferis . . . Petala brevissima, ovalia" (*Michx.* Fl. Bor.-Am. i. 275); that *Hooker*, with material from "Throughout Canada" which, as shown by his detailed and critical discussion (his p. 99), he clearly understood, should have described *S. borealis* unequivocally "petalis bipartitis calyce aucto trinervia vix longioribus" (*Hook.* Fl. Bor.-Am. i. 94); that *Torrey & Gray*, both familiar with the common eastern plant, should have characterized *S. borealis* with "petals (sometimes none) 2-parted, nearly the length of the . . . sepals" (*T. & G.* Fl.

N. Am. i. 185). Michaux, Bigelow, Hooker, Torrey and Gray all knew their plants; and their uniform characterization of *S. borealis* (or *calycantha*) as having petals (sometimes not) is supported by the experience of others who have long known (some of us for more than half-a-century) the wide-ranging and highly variable plant with relatively short sepals, capsules, styles and seeds.

As to Hultén's other point, that the larger-flowered western series which he calls a distinct species, *Stellaria sitchana*, has "the stem . . . scabrous," while the small-flowered *S. calycantha* (*S. borealis*) "has a smooth . . . stem," I can only regret that he did not study a very full series of the North American plants. Had he examined with a medium-power binocular a good series of such plants as *S. calycantha* and vars. *isophylla* and *floribunda*, he would have found the stems of some plants glabrous, of others fully as scabrous (and that only remotely) as in much of the material of *S. sitchana*. PLATE 603, FIG. 3, shows a portion of stem,  $\times 10$ , of *S. calycantha*, var. *sitchana* from Wrangel, Alaska, July 22, 1891 (Cooley); while FIG. 4 is a similar piece, also  $\times 10$ , of stem of var. *isophylla* from Madison County, New York (House, no. 17,651). The reputed "specific" difference, that the stem of the former is scabrous, that of the latter smooth, obviously is an unstable one.

The one usually decisive character which distinguishes vars. *sitchana* and *Bongardiana*, with mature calyx 4–5.5 mm. long and mature capsule 5–8 mm. long, from the series of *Stellaria calycantha*, with mature calyx 2–3.5 (–4) mm. long and capsules 3–5 mm. long, is the strong reflexing of the fruiting peduncles in the former series (this one often apparently constant, though only tardily developed, distinctive character not mentioned by Hultén), for the local var. *laurentiana*, of shores of the Gulf of St. Lawrence in Quebec, with ascending fruiting peduncles, is otherwise inseparable from the western var. *Bongardiana*. This character, however, loses its virtue when the fruiting peduncles of the small-flowered eastern plant become reflexed (see PL. 603, FIG. 2).

Typical *Stellaria calycantha* has glabrous or only remotely scabrous stems. On the mountains from Washington to Montana and northern California var. *Simcoei* closely resembles it in its

short and broad leaves, but the upper branches are definitely pilose. It is, therefore, noteworthy that Dr. G. N. Jones, unquestioningly accepting (Fl. Pl. and Ferns of Mt. Rainer, 76) Hultén's verdict, that *S. sitchana* is a distinct species, reduces without comment the local and uniquely pilose-stemmed *S. Simcoi* to the synonymy of the wide-ranging glabrous *S. calycantha*. Right here is a key-note to the whole situation. The series is one of the hundreds of plastic boreal species, growing extensively across or near the areas in which Pleistocene activity was extensive. Such species appear in different areas in somewhat different phases. To me these are geographic varieties, so confluent in their different characters that the sorting of specimens into piles with more than a single character semi-constant is seemingly impossible. Until some stable character besides the tardy reflexing of the peduncles is demonstrated for the western *Stellaria sitchana* I must continue to retain it within the plastic and wide-ranging *S. calycantha*.

**LYCHNIS ALPINA** L., var. **americana**, var. nov., omnibus partibus majoribus quam in planta Europaea; foliis radicalibus subcoriaceis 1.5–6.5 cm. longis 2–8 mm. latis; foliis caulinis 3–7-jugis, imis 1.5–5.5 cm. longis 2.5–10 mm. latis; calycibus 5–7 mm. longis; petalis roseis 8.5–14.5 mm. longis 3–6 mm. latis.—Greenland, Labrador, Newfoundland and eastern Quebec, southward confined to magnesian soils. TYPE: serpentine and magnesian limestone barrens, northeastern bases and slopes of Blomidon ("Blow-me-down") Mountains, Bay of Islands, Newfoundland, July 24, 1910, *Fernald & Wiegand*, no. 3395 (Herb. Gray).

Forma **albiflora** (Lange), comb. nov. *Viscaria alpina* (L.) Fenzl, forma  $\beta$ . *albiflora* Lange, Consp. Fl. Groenl. 19 (1880).

The albino form of var. *americana* is rare in comparison with the ordinary rosy-flowered plant.

The North American plants are usually coarser throughout than *Lychnis alpina*, var. *typica*<sup>1</sup> of Europe. Occasional collections from Iceland and Italy are as stout as ours and some from Iceland and Norway have flowers approaching ours in size. Furthermore, dwarfed American plants (especially from Greenland) may be as small as in some European specimens; but the average and ranges of size of the different organs shows a marked

<sup>1</sup> *LYCHNIS ALPINA* L., var. **typica**. *L. alpina* Sp. Pl. i. 436 (1753).

geographic segregation. 36 series of the European plant (typical *L. alpina*), including 130 plants, and 64 series, including 175 plants, of var. *americana* give the following results.

#### Var. TYPICA

Radical leaves 1-3.5 cm. long, 2-5 mm. broad; cauline leaves 2-4 pairs, the larger leaves 1-3 cm. long and 2-5 mm. broad; calyx during anthesis 3-5 mm. long; petals (including claw) 6-8 (rarely -9) mm. long, 3-3.5 (-4) mm. broad.

#### Var. AMERICANA

Radical leaves thicker and firmer, 1.5-6.5 cm. long, 2-8 mm. broad; cauline leaves 3-7 pairs, the larger leaves 1.5-5.5 cm. long and 2.5-10 mm. broad; calyx during anthesis 5-7 mm. long; petals (including claw) 8.5-14.5 mm. long, 3-6 mm. broad.

The stature is variable but the following comparison is illuminating. Of var. *typica* 38% of the plants are less than 1 dm. high, of var. *americana* only 13%. Of var. *typica* 39% are from 1-1.5 dm. high, of var. *americana* 29%. Of var. *typica* only 14% are from 1.5-2 dm. high, of var. *americana* 29%. Of var. *typica* only 7% of the plants are 2-3 dm. high, of var. *americana* 27%, while no plants seen by me of var. *typica* are more than 3 dm. high, but 2% of var. *americana* are 3-4 dm. high.

Similarly, all but a few of the plants of var. *typica* have the stem (dried) at most 2 mm. in diameter at the first cauline node; but most plants of var. *americana* have the stems 2-4 mm. in diameter.

SILENE CAROLINIANA Walt., var. **pensylvanica** (Michx.), comb. nov. *S. pensylvanica* Michx. Fl. Bor.-Am. i. 272 (1803). *S. caroliniana*, subsp. *pensylvanica* (Michx.) Clausen in RHODORA, xli. 580 (1939).

*S. CAROLINIANA* Walt., var. **Wherryi** (Small) comb. nov. *S. Wherryi* Small in Torrey, xxvi. 66 (1926). *S. caroliniana*, subsp. *Wherryi* (Small) Clausen, l. c. 582 (1939).

WHAT IS ACTAEA ALBA? (PLATE 604). Two clearly defined species of *Actaea* occur in the northeastern states and southern Canada. They are distinguished as follows.

1. *A. ALBA* Bigel. in Eaton, Man. ed. 2: 123 (1818) and Fl. Bost. ed. 2: 211 (1824); Hook. Fl. Bor.-Am. i. 27 (1829); Torr. & Gray, Fl. N. Am. i. 35 (1838); and Gray, Britton, Robinson & Fernald and most subsequent authors; not *A. alba* Mill. Dict. ed. 8, no. 2 (1768) nor *A. spicata*,  $\beta$ . *alba* L. Sp. Pl. 504 (1753) nor, nomenclaturally at least, the following, resting upon the latter names: *A. americana* Pursh, *A. alba* Pursh, Fl. Am. Sept. ii. 366





Photo. W. H. Hodge.

ACTAEA PACHYPODA: FIG. 1, fruiting raceme (dried),  $\times 1$ , from Nova Scotia.  
A. RUBRA, forma NEGLECTA: FIG. 2, fruiting raceme (dried),  $\times 1$ , from Vermont.



Photo. W. H. Hodge.

*RORIPPA ISLANDICA*, var. *MICROCARPA*: FIG. 1, ISOTYPE of *Nasturtium palustre*, var. *microcarpum*,  $\times 1$ , from Amur (2 plants); FIG. 2, fruiting raceme of isotype of *R. islandica*, var. *Fernaldiana*,  $\times 1$ , from Maine.

Var. *HISPIDA*: FIG. 3, siliques,  $\times 5$ , from Idaho, of *Nelson & Macbride*, no. 1318, distributed as *R. terrestris globosa* Nelson and cited by Butters & Abbe as *R. islandica*, var. *glabrata*; FIG. 4, siliques,  $\times 5$ , from New York; FIG. 5, silique,  $\times 5$ , from New Mexico, of *Heller & Heller*, no. 3743, cited by Butters & Abbe as *R. islandica*, var. *glabrata*; FIG. 6, tetracarpellate silique,  $\times 5$ , from Saguenay Co., Quebec; FIG. 7, silique,  $\times 5$ , from Lake St. John, Quebec; FIG. 8, young tri- or tetracarpellate silique,  $\times 5$ , from Rhode Island.

*R. BARBAREAEFOLIA*: FIG. 9, raceme,  $\times 1$ , of authentic specimen from Amur.

(1814) and *A. brachypetala* DC.,  $\alpha$ . *alba* DC. Syst. i. 385 (1817). *A. pachypoda* Ell. Sk. ii. 15 (1821); Mackenzie in Torrey, xxviii. 53 (1928). *A. brachypoda* Rydb. Fl. Pr. Pl. 345 (1932), ascribed to Elliott and obviously an error for *A. pachypoda* Ell. —Pedicels in fruit becoming relatively thick, red or reddish; petals slender, mostly truncate; stigma during anthesis broadly sessile; fruits white, capped by the broad sessile purple stigma (whence the colloquial name DOLL'S EYES); seeds (3-) 5-10, 4-5 mm. long. PLATE 604, FIG. 1.

A form of *A. "alba,"* as above defined, has dark-red fruits. This is

A. ALBA, forma RUBROCARPA Killip in House, N. Y. State Mus. Bull. 243-244: 40 (1923).

It seems to be an extreme with darker fruits than in *A. brachypetala* DC.,  $\delta$  *microcarpa* DC. Syst. i. 385 (1817), described from near Boston with "baccis parvis albis subrubellis, pediculis incrassatis."

2. A. RUBRA (Ait.) Willd. Enum. 561 (1809) and most subsequent authors. *A. spicata*,  $\gamma$ . *rubra* Ait. Hort. Kew. ii. 221 (1789) and many later authors. *A. americana* Pursh and  $\beta$ . *rubra* Pursh, Fl. Am. Sept. ii. 366, 367 (1814). *A. brachypetala* DC.,  $\beta$ . *rubra* DC. Syst. i. 385 (1817). *A. longipes* Spach, Hist. Veg. vii. 388 (1839). —Pedicels filiform; petals rhombic-spatulate, tapering to tip; stigma during anthesis slightly elevated above summit of ovary, in fruit contracted and relatively inconspicuous; fruit cherry-red; seeds 10-16, 3-4 mm. long.

The form with white fruits is

A. RUBRA, forma NEGLECTA (Gillman) Robinson in RHODORA, x. 66 (1908). *A. neglecta* Gillman in Lloyd, Drugs and Medicines, 235 (1884-5). *A. eburnea* Rydb. Mem. N. Y. Bot. Gard. i. 153 (1900). *A. alba* sensu Mackenzie in Torrey, xxviii. 53 (1928) and sensu Rydb. Fl. Pr. Pl. 345 (1932); not Miller nor Bigelow. PLATE 604, FIG. 2.

That species nos. 1 and 2 are wholly distinct everyone agrees. No. 1, our *Actaea "alba"* (PLATE 604, FIG. 1), is essentially southern, reaching Georgia, Louisiana and Oklahoma at the south and merely entering the southernmost borders of Canada; no. 2, our *A. rubra*, is northern, extending from Labrador to interior Alaska, becoming rare so far south as southern New England, northern New Jersey, southern New York, and westward into the Rocky Mountains. Until Mackenzie positively asserted that the Cornut

plate (which started the name *A. alba* as used unequivocally for a century and three-fourths) was based upon the white-fruited form (forma *neglecta*) of *A. rubra* (PLATE 604, FIG. 2), everything was clear. Now, however, since Mackenzie's assertion (his pp. 52 and 53) that Cornut "very accurately figured" "our baneberry with slender pedicels," our *A. rubra*, forma *neglecta*, and that the latter "should be known by that name [*A. alba*], and . . . the ordinary red-fruited plant should be known as a form," the clarity of the past has suddenly been clouded. Rydberg promptly accepted Mackenzie's unqualified verdict; but, had he taken pains to look up the "very accurate" plate of Cornut, he would have found the fruiting raceme very far from convincing for any form of *A. rubra*, for the latter has the divergent filiform fruiting pedicels (FIG. 2) 1-2.5 cm. long. It is at least diverting that Mackenzie, apparently alarmed at the changes he was proposing, seems not to have been so uncompromisingly literal as in some of his other interpretations, when he proposed and chose a second alternative. Dismissing the plant with thick pedicels (PL. 604, FIG. 1) to which the name *A. alba* had previously been most applied and asserting without qualification that the Cornut plate (our p. 265, FIG. 1) is a "very accurate figure" of the white-fruited plant with slender divergent pedicels, *A. rubra* forma *neglecta* PL. 604, FIG. 2), he forthwith said:

"On the other hand, one can follow nature [as if the abundant white fruits are not natural!] and say that the red-fruited plant is undoubtedly the specific type, and that the first name applied to it (*Actaea rubra*) should be adopted, although published after *Actaea alba*. In this case one would treat the plant of Linnaeus [*A. spicata*,  $\beta$ . *alba* L., based on the Cornut plate] and of Miller [*A. alba* Mill. (1768)] as a form of *Actaea rubra* [*A. rubra* (Ait.) Willd. (1809)]." And he concluded: "My own preference is for the second course here indicated"!

Rydberg, although accepting the name *Actaea alba* for the plant with white fruits on slender pedicels, did not follow Mackenzie's preference to treat it as a form of the later-published *A. rubra*. He maintained them both as species, one with the white fruit "9-12 mm. long" and with seeds "about 4 mm. long," the other with red fruit "10-12 mm. long" and seeds



"about 3 mm. long." Measurement of many seeds of each series shows them all the way from 3 to 4 mm. in length.

The whole difficulty arose from misunderstanding from the first of Cornut's plate, Cornut, Can. Pl. t. 77 (our p. 265, FIG. 1), which, as emphasized, Mackenzie considered as a "very accurate" figure of *Actaea rubra*, forma *neglecta* (PL. 604, FIG. 2). In publishing *A. spicata*,  $\beta$ . *alba* in 1753 Linnaeus rested the variety, without new description, wholly on the plate of Cornut (our p. 265, FIG. 1) and upon the figure in Morison's *Historia*, ii. fol. 1, t. 2, fig. 7 (our p. 265, FIG. 2), which was obviously copied directly from Cornut. In publishing *A. alba* in 1768 Miller gave the briefest of diagnoses and cited Morison (therefore by inference Cornut). Linnaeus had no material and Mackenzie states that there is nothing preserved to stand for Miller's plant. We, therefore, get back, automatically, to the Cornut plant (our p. 265, FIG. 1) as the only clear basis for *A. alba*; and that that is *not* a clear basis for any American species is apparent. The first definite differentiation of our two species was by Jacob Bigelow, first in Eaton's *Manual* (1818), later and very completely in *Florula Bostoniensis*, ed. 2 (1824). That *A. alba* sensu Bigelow and later authors was also *A. pachypoda* Ell. everyone has recognized; but the interpretation by Mackenzie and, following him, by Rydberg, that *A. alba*, as typified by the Cornut plate, is the slender-pedicelled *A. rubra*, forma *neglecta* (PL. 604, FIG. 2) is unique.

Cornut's *Canadensium Plantarum Historia* (1635) had an unfortunately misleading title, for, as repeatedly pointed out, it contains many plants which, at that date, had surely never seen Canada. Some, as indicated in the text, were admittedly not Canadian (*Bugula odorata lusitanica*, *Cyclamen orientale*, *Arundo indica*, etc.); others were wrongly supposed to be Canadian. To the latter group belongs, I think, the illustration of *Aconitum baccis niveis [et rubris]* which was the basis of *Actaea spicata*,  $\beta$ . *alba* L. and the only identifiable basis of *Actaea alba* Mill. Mackenzie (l. c. 53) had no doubt of the identity of Cornut's fruiting raceme with the American *A. rubra*, forma *neglecta*, saying: "Both the illustration by Cornut and the illustration by Morison represent a plant with slender pedicels and having an ovoid raceme and ovoid or ellipsoid berries. The

only definite points to go on with Miller are his phrase 'racemo ovato' and his reference to Morison's figure. In other words, Cornut, Morison, Linnaeus and Miller all seem to have been dealing solely with *Actaea rubra*, f. *neglecta*." Had Mackenzie read Cornut's latin text he would have found some contradiction to the ellipsoid fruits of the plate in Cornut's statement that upon maturing the ovary becomes orbicular in outline. There is also food for thought in the statement by Cornut that the fruits may be red ("Baccae plerumque variant: vidimus enim etiam rubellas"). Incidentally, if one examines good material and illustrations of the European *Actaea spicata* L., described (by Moss, for instance, in the Cambridge British Flora, iii. 152) with "*Pedicels* about as long as the flowers" and with "*Fruit* . . . elliptical," he will have before him the species which was illustrated by Cornut! In order to show all the species which have been called *Actaea alba*, I have asked Mr. Hodge to reproduce the figures of Cornut (p. 265, FIG. 1) and of Morison (FIG. 2); a representative fruiting raceme (PL. 604, FIG. 1) of *A. alba* Bigel. and most later authors (*A. pachypoda* Ell.), from Granville, Nova Scotia (*Bartram & Long*, no. 23,862); a typical fruiting raceme (PL. 604, FIG. 2) of *A. rubra*, forma *neglecta*, from Willoughby, Vermont, July 11, 1898 (*Kennedy*); and reproductions from European plates of *A. spicata*: p. 265, FIG. 3 showing a flowering raceme from Moss, Cambr. Brit. Fl. iii. pl. 163; FIG. 4, a fruiting inflorescence from Schlechtendal, Langenthal & Schenk, Fl. Deutschl. ed. 7, xi. t. 1087; FIG. 5, a fruiting raceme from Sturm, Fl. Deutschl. ed. 2, v. t. 39. That these figures of *A. spicata* are much closer to the plate of Cornut than are the two American species which have long been identified with it is apparent. To me it seems clear that Cornut had mixed material; his plate was obviously made from the European *A. spicata*, but his phrase "baccis niveis" and possibly some others came from American material he had received. At best the basis of *A. alba* Mill. was confused and I am taking up for *A. alba* sensu Bigel. and most later authors the unequivocal *A. pachypoda* Ell. This necessitates the following transfer.

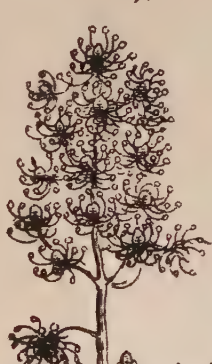
ACTAEA PACHYPODA Ell., forma **rubrocarpa** (Killip), comb. nov. *A. alba*, forma *rubrocarpa* Killip in House, N. Y. State Mus. Bull. 243-244; 40 (1923).

# ONITVM BACCIS NIVEIS ET RVBRIS

(1)



7. *Christophoriana Americana*, Park. ejusque flores & baccae  
 corymbatim in spicam congestae. *Aconitum baccis niveis & rubris*,  
 Corn.



2



3



4



5

ACTAEA SPICATA: FIG. 1, portion of the Cornut plate of ACONITUM BACCIS NIVEIS  
 [ET RUBRIS], basis of A. SPICATA,  $\beta$ . ALBA L. and of A. ALBA Mill.; FIG. 2, portion of  
 Morison's figure of CHRISTOPHORIANA AMERICANA, cited by Linnaeus under A.  
 SPICATA,  $\beta$ . ALBA; FIG. 3, flowering raceme,  $\times 1$ , after Moss; FIG. 4, fruiting raceme,  
 $\times 1$ , after Schlechtendal, Langethal & Schenk; FIG. 5, fruiting raceme,  $\times 1$ , after  
 Sturm.

CIMICIFUGA RACEMOSA (L.) Nutt., forma **dissecta** (Gray), comb. nov. *C. racemosa*, var. *dissecta* Gray, Man. ed. 6: 47 (1890).

DESCURAINIA PINNATA (Walt.) Britton, var. **brachycarpa** (Richardson), comb. nov. *Sisymbrium brachycarpum* Richardson in Frankl. 1st Journ. App. 744 (repr. 16) (1823). *S. canescens* Nutt., var. *brachycarpum* (Richardson) Wats. Bibl. Index, 69 (1878). *S. pinnatum*, var. *brachycarpum* (Richardson) Jepson, Fl. Calif. ii. 46 (1936). *D. pinnata*, subsp. *brachycarpa* (Richardson) Detling in Am. Midl. Nat. xxii. 509 (1939). *D. pinnata brachycarpa* (Richardson) F. C. Gates in Trans. Kansas Acad. Sci. xlii. 137 (1940), the rank not definitely stated but the indecisive statement made on p. 135: "The trinomial in botany is usually referred to as a variety, although the designation subspecies would appear to be more reasonable."

The International Rules of Botanical Nomenclature quite reasonably recommend "not to publish a new name without clearly indicating whether it is the name of a family or a tribe, a genus or a section, a species or a variety; briefly, without expressing an opinion as to the rank of the group to which the name is given" (Recommendation xxi.). Furthermore, names or combinations put forward without clear statement of rank but with a suggestion that they belong in one or the other of two ranks (others besides the publishing author to make the decision), are invalid under the generally accepted International Rules. At the Amsterdam Congress (1935) the rule was accepted that "A name of a taxonomic group is not validly published unless it is *definitely accepted* by the author who publishes it. A name proposed provisionally (*nomen provisorium*) in anticipation of the eventual acceptance of a group, or of a particular circumscription, position or rank of a given group . . . is not validly published."—See Sprague in Journ. Bot. lxxiv. 75 (1936). This rule was adopted to guard against names put out in such indefinite status that the author leaves alternatives open in interpreting his real meaning.<sup>1</sup>

<sup>1</sup> The paper, *New Forms and Nomenclatorial Combinations in the Kansas Flora*, in Trans. Kansas Acad. Sci. xlii. 135-138 (1939, perhaps really 1940, the volume received at the Gray Herbarium March 4, 1940, the reprint March 19, 1940) contains several combinations which certainly are not new.

*Descurainia intermedia* (Rydberg) F. C. Gates (late 1939 or early 1940) is antedated by *D. intermedia* (Rydb.) Daniels in Univ. Mo. Studies, Sci. ser. i. 289 (repr. 147) (1907). *D. Richardsoniana* ("Sweet") F. C. Gates, said to be based on *Sisymbrium "Richardsoniana"* Sweet, Hort. Brit. ed. 2: 30 (1830), error for *S. Richardsonii* Sweet, is *D. Richardsonii* (Sweet) O. E. Schultz in Engler, Pflanzenreich, iv<sup>105</sup>. 318 (1924). *Fraxinus pennsylvanica campestris* (Britton) F. C. Gates (1939 or 1940) was published as new by the same author also in 1938; *Apocynum cannabinum album* (Greene) F. C. Gates would have been a new



THE EASTERN AMERICAN VARIETIES OF *RORIPPA ISLANDICA* (PLATE 605). In 1928 I pointed out<sup>1</sup> that the plants then passing as *Rorippa* (or *Nasturtium* or *Radicula*) *palustris* should take an older specific epithet and should be called *Rorippa islandica* (Oeder) Schinz & Thellung. At that time I showed that the two common plants of North America are very different from the true Old World *R. islandica*. Subsequently<sup>2</sup> I suggested that the basic name, *Sisymbrium islandicum* Oeder, Fl. Dan. tab. 409 (1768), was invalid because published with a mark of interrogation and in a work partly polynomial in nomenclature; and, quoting European correspondents, I pointed out that the combination *Rorippa islandica* is carried back to Borbás. Later authors have, however, shown that *Sisymbrium islandicum* was validated, before any other specific epithet was published, by Murray in Nov. Com. Gott. iii. 81 (1773).

In the Journal of Botany, lxxvii. (Dec., 1939), Dr. T. A. Sprague made the characteristically British argument that the binomials of Oeder in Flora Danica, iii. are not invalidated by the rule adopted at Cambridge in 1930, as proposed by Sprague and his British associates: "Art. 68. Specific epithets are illegitimate in the following cases and MUST BE REJECTED [emphasis mine] . . . (4) When they were published in works in which the Linnean system of binary nomenclature WAS NOT CONSISTENTLY EMPLOYED." I am reproducing from Flora Danica, iii. a few treatments of species (p. 269). To him who runs it is sufficiently clear that "binary nomenclature was not consistently employed." If it had been, on the sophisticated basis argued by Sprague (that Oeder gave somewhere amidst the polynomial descriptive phrases emphasis to a Linnean binomial by use of roman type), why did Oeder not use Roman type somewhere under the text of tab. DXXIII? The polynomial phrases wholly in italics are exactly

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combination only if the trinomials meant subspecies, for as a variety it is *A. canabinum*, *θ album* (Greene) Béguinot & Belosersky, Rev. Monogr. del Gen. Apocynum, 105 (1913). *Astragalus longifolius* (Pursh) F. C. Gates has the same basonym as *A. longifolius* (Pursh) Rydberg, Fl. Neb. pt. 21: 47 (1895). *Gaura coccinea parviflora* (Torr.) F. C. Gates might have been a new combination if the author had unequivocally announced it as a subspecies. As a varietal name it is identical with *G. coccinea*, var. *parviflora* (Torr.) Rickett in Kew Bull. 1934: 57 (1934). *Rhus Toxicodendron Negundo* (Greene) F. C. Gates (1939 or 1940) was also published by the same author in 1938.

<sup>1</sup> RHODORA, xxx. 132 (1928).

<sup>2</sup> RHODORA, xxxi. 17 (1929).

those used by Linnaeus in 1753 as his bases for the binomial *LAMIUM PURPUREUM*. Again, by Sprague's interpretation, binomial nomenclature was consistently employed by Oeder when, under tab. CCCLXXVI, he buried as effectively as possible the Linnean binomial *RANUNCULUS AQUATILIS* as a synonym under his third polynomial citation. In fact, a large proportion of the Linnean binomials cited by Oeder in this volume are given only in synonymy or in the 2nd or 3d string of polynomials. How, furthermore, can it be maintained that, in the explanation of the beautiful illustrations of the four wholly different mosses in tab. DXXXVIII, "the Linnean system of binary nomenclature was . . . consistently employed"? Three of the four species (75%) are under completely italicized polynomials, only the fourth having roman type employed for the "trivial" name.

Article 68 (4) of the International Rules was Art. 72 (3) of the Proposals of the Sub-Committee on Nomenclature of the British Botanical Conference (1929), presented to the International Botanical Congress of 1930 in "An attempt to remove various sources of ambiguity in the Rules" (p. 5). By many of those who supported the British proposal it was inferred that the rule was essentially clear; by Sprague's latest interpretation it is evident that to him, at least, its meaning is essentially *ambiguous*. Many of us who have long fought for international agreement in plant nomenclature and who still believe in such an ideal can see only disagreement if those in positions of authority in this technical and to most of us tedious, though unescapable evil, allow themselves to become advocates of violation of both the spirit and the letter of the rules. The difficulties are sufficient without seeking to increase them.

In a recent number of *RHODORA* (xlii. 25-32) Butters & Abbe correctly take up *Rorippa islandica* (Oeder ex Murr.) Borbás for the inclusive species and they there honor me by describing as *R. islandica*, var. *Fernaldiana* the plant which I had mistakenly called *Rorippa hispida* (Desf.) Britton, var. *glabrata* Lunell, and which Victorin, following my misidentification of Lunell's plant, had called *R. palustris*, var. *glabrata* (Lunell) Victorin. Butters & Abbe publish a photograph (their plate 588) of Lunell's type, showing it to be very close to *R. islandica*, var. *hispida* (Desv.) Butters & Abbe. They thus have cleared the identity

T A B. CCCLXXVI.

*Ranunculo* sive *Polyanthemo aquatili albo affine millefolium maritriphyllum fluitans.* J. B. II. 774.  
*Ranunculus aquatilis, albus, fluitans, Peucedani foliis.* Herm. Lugdb. 516.  
*Ranunculus caule fluitante, petiolis unifloris, foliis capillaceis, longissimis, laciniis parallelis.* Hall  
 1161. Rupp. Jen. Hall. 104. *Ranunculus aquatilis* d. Linn. Sp. pl. 782.  
 Locus. In fluentis rapidioribus, e. g. fluvio *Hunte* prope *Dödingen*.

T A B. CCCXC.

*Saxifraga foliis caulinis palmatis petiolatis, caule bulbifero subramoso & multiflora. an S. bulbifera?*  
 Locus. Ex Islandia attulit Clar. J. G. Koenig, lectam prope *Adner See, Saide Fiall, Hraffntinna Fial*  
 prope *Krafft*.

T A B. CCCCIX.

*Sisymbrium, (islandicum?) siliquis brevibus declinatis, foliis hyatopinnatis, foliolis ovalibus  
 dentatis.*  
 Locus. In horto nobis luxuriat natum ex seminibus a Dno *Koenig* ex Islandia allatis, ubi crescit prope  
 scaturigines calidae, & alibi locis udis. Vereor autem ut a *S. sylvestris* latius differat.

T A B. DXXXIII.

*Lamium purpureum fetidum folio subrotundo.* C. B. P. 230. Kyll. Vir.  
*Lamium, purpureum, foliis cordatis obtusis petiolatis.* Linn. S. N. 393. Hall. 272.  
 Locus. Vulgatissimum in cultis & fimetis.

T A B. DXXXVIII.

1. *Bryum, foliis capillaribus, capsulis ovalibus erectis in pedunculis brevibus.*  
 In *Saxis Norvegiæ*.
2. *Bryum, foliis setaceis curvatis, capsulis erectis obtuse ovatis, capitello oblique rostrato, apophysi  
 capitulo subjecta.*  
 In humis irrigua atra schisti montis *Eckeberg* prope *Christiania*, agnoscitur calyptra nigra in  
 capsula viridi, diversum a *B. viridulo*.
3. *Bryum, foliis subulatis, capsulis sphaericis striatis in pedunculis brevibus lateralibus.*  
 In alpebus *Norvegiæ*.  
 cf. *Bryum foliis mollibus subulatis, setis brevissimis alaribus, capsulis ovatis.* Hall. 1802.  
 t. 46. f. 8. Enum. 1128.
4. *Mnium, cirrhatum, foliis arefatione revolutis.* Linn. S. N. 700. Dill. t. 48. f. 42.  
 Enum. 995. cf. Hall. 1786.  
 In sylvis & ad sepes.

Some Treatments of Species by Oeder in *Flora Danica*, vol. iii, showing that  
 "binary nomenclature was not consistently employed" in that Volume.

of Lunell's variety, but in doing so they seem inadvertently to have overlooked some points which would have greatly changed some of the varietal combinations they published.

Taking advantage of the printing of their study of the American varieties of *Rorippa islandica* and their clarification of the identity of the Lunell plant, *R. islandica*, var. *glabrata* (Lunell) Butters & Abbe, I undertook the needed revision of the genus for the Gray's Manual area; but, unfortunately, I am unable to maintain either var. *glabrata* or the very gratifying name var. *Fernaldiana*. My reasons follow.

*Rorippa islandica*, var. *Fernaldiana* is well represented in the Gray Herbarium by many sheets from Japan, Amur and Manchuria. They are so very unlike typical *R. islandica* (with very thin deeply pinnate cauline leaves and ellipsoid arcuate siliques) that it seemed most improbable that the acute students of the eastern Asiatic floras should not have detected the difference. They did detect it as early as 1861, when Regel beautifully described the plant in his Tentamen Florae Ussuriensis, Mém. Acad. Imp. Sci. St.-Pétersb., sér. 7, iv. no. 4: 20 (1861), as *Nasturtium palustre*, var. *microcarpum*. To be sure, N. Busch, Fl. Sib. et Orient. Extr. xxv. Crucif. 203 (1915), took up *N. palustre*, var. *microcarpum* in the sense of his *N. palustre*, var. *brevisiliquum* N. Busch, Rhoead. 326 (1909) and illustrated as var. *microcarpum* siliques of the latter, which to me are very characteristic fruits of var. *hispidum* (Desv.) Butters & Abbe, and the latter authors specially comment that "Some of the fruits of Siberian plants figured by Busch under the name '*Nasturtium palustre* var. *microcarpum* Rgl.' are very similar to those of var. *glabratum* . . . This combination, published, according to Busch in 1861, of course greatly antedates Lunell's, but from the very meager information available it is impossible to say whether the plants are in all respects identical. It seems best therefore for the present to retain Lunell's varietal name."

It is too bad that Butters & Abbe accepted Busch's misidentification of *Nasturtium palustre*, var. *microcarpum*.<sup>1</sup> The original description could easily have been secured and a probable isotype

<sup>1</sup> Busch also erred (his p. 207) in treating as *N. hispidum* (Desv.) DC. the very large-fruited *Camelina barbareaefolia* DC. or *Rorippa barbareaefolia* (DC.) Kitagawa, which he correctly describes as having fruits up to 9 mm. long and 5 mm. broad—measurements never met by *N. hispidum* or *R. islandica*, var. *hispidum*.



of Regel's variety was quickly available for the asking. Here is Regel's original account:

58. *Nasturtium palustre* D. C. var. *microcarpum*:

caule tenui deinde ramosissimo; fol. lyratis v. pinnatifidis v. subintegris; floribus luteis; siliquis parvis linearibus v. oblongo-ellipticis, nec turgidis.

Am obern Ussuri bei Damgu und der Mürenmündung, auch am Sungatschi.

Siliquae parvae, pedicello plerumque breviores, saepissime in paniculam ramosissimam densam congestae, in pedicello patentissimo ascendentes.

Liegt uns auch nebst der vorhergehenden Form in Exemplaren vor, die Maximowicz am Amur sammelte.

Fortunately a sheet of the Maximowicz collection from Amur, which Regel said was representative of his *Nasturtium palustre*, var. *microcarpum*, is in the Gray Herbarium. It is a relatively small plant, but other eastern Asiatic specimens quite like it in foliage and fruit are several times as tall. PLATE 605, FIG. 1, is this authentic specimen,  $\times 1$ , of *N. palustre*, var. *microcarpum* Regel; FIG. 2 is a small portion of fruiting inflorescence,  $\times 1$ , from an isotype of *Rorippa islandica*, var. *Fernaldiana*. I do not see the difference. I am, consequently, forced into the seemingly ungracious necessity to reduce var. *Fernaldiana* to

*RORIPPA ISLANDICA* (Oeder ex Murr.) Borbás, var. *microcarpa* (Regel), comb. nov. *Nasturtium palustre*, var. *microcarpum* Regel in Mém. Acad. Imp. Sci. St.-Pétersb. sér. 7, iv. no. 4 (Tent. Fl. Ussur.), 20 (1861). *R. islandica*, var. *Fernaldiana* Butters & Abbe in RHODORA, xlii. 28 (1940).

The only possibility which may make it allowable to retain the name *Rorippa islandica*, var. *Fernaldiana* is the doubtful one, that some very recent European student has made the combination *R. islandica*, var. *microcarpa* for a wholly different plant. In 1892 Beck von Mannagetta, apparently not cognizant of the earlier variety of Regel (under *Nasturtium*) published a form of the pinnate-leaved European *R. palustris*, with more ellipsoid siliques at most 4 mm. long, as *R. palustris*,  $\beta$ . *microcarpa* G. Beck, Fl. Nied.-Österr. ii<sup>1</sup>. 466 (1892). This has later become *Radicula palustris*, var. *microcarpa* (G. Beck) C. E. Britton in Bot. Exch. Cl. Brit. I Rep. for 1919: 806 (1920); also *Rorippa islandica*, forma *microcarpa* ascribed (erroneously) to Beck by Thellung in Hegi, Ill. Fl. Mitt.-Eu. iv<sup>1</sup>. 317 (1919). I have not

found Beck's varietal name for the short-fruited typical *Rorippa islandica* used in that rank under *R. islandica*; if it has been properly transferred, with Beck's plant as the type, then var. *Fernaldiana* will automatically have to be taken up.

Even the varietal names here used, var. *microcarpa*, starting in 1861, and var. *hispida*, first used in varietal rank in 1856, are liable to upset. Dr. Hara calls my attention to *Nasturtium palustre*, vars. *majus* and *minus* Ledeb. Fl. Alt. iii. 8 (1831). The characterizations of Ledebour do not make clear whether his plants belong to one or both of the common varieties which occur in Asia and cross North America. When Ledebour's types (at Leningrad) can be properly studied a shifting of varietal combinations may necessarily result.

In their paper Butters and Abbe discuss at great length the type of *R. islandica* (Oeder ex Murr.) Borbás, var. *glabrata* (Lunell) Butters & Abbe, and set off under this name a selected series of five specimens from a somewhat unnatural area, North Dakota, Idaho and New Mexico, because, among other characters, "Most of the specimens of this entity have a large number of tricarpellate and tetracarpellate siliques." They had earlier (p. 26) stated that var. *glabrata* was originally thought by Lunell, when he published it as *R. hispida*, var. *glabrata*, to be "a glabrous form of the latter [*R. hispida*, i. e. *R. islandica*, var. *hispida*], which is evidently very close to its true status." It seems to me that they might, happily, have rested the case there. They based their deductions regarding the semi-cosmopolitan *R. islandica* and its many varieties upon measurements of only 93 specimens of the whole series. Had they seen a much greater representation from the whole range it is probable that they would have found their western var. *glabrata* not separable from great numbers of eastern specimens of var. *hispida* (Desv.) Butters & Abbe. I have before me 204 sheets of this single variety. The type of var. *glabrata* is closely matched or approached by material from Newfoundland (*Fernald & Wiegand*, no. 5486), Maine (Foxcroft, *Fernald*, type of *R. palustris*, var. *hispida*, forma *inundata* Victorin; East Machias, August 7, 1935, *Knowlton*), Ontario (Bruce Co., *Krotkov*, no. 7481) and Ohio (Oberlin, July 13, 1894, *W. M. Dick*). I have before me both numbers from Idaho cited by Butters & Abbe under their var. *glabrata*.

One, the type number of *R. terrestris globosa* Nelson, is too young for proper study but the other, *Nelson & Macbride*, no. 1318, was also distributed as *R. terrestris globosa* Nelson. In foliage this is matched or closely approached by so many plants (for instance *Abbe*, no. 1206 from Fog Island, Saguenay Co., Quebec) from Newfoundland, Quebec, Nova Scotia, New England, New York, Michigan and Indiana that their enumeration would be cumbersome. Similarly the small (2.5–4 mm. long, 1.7–2.2 mm. thick) ellipsoid to rounded-obovoid siliques of no. 1318 (FIG. 3) are so closely matched by fruits of specimens from Quebec, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York (FIG. 4), Pennsylvania, Virginia and Florida, that I can merely offer the loan of these sheets to any who are skeptical. The New Mexican material picked out by Butters and Abbe as their var. *glabrata* is *Heller & Heller*, no. 3743. The very full sheet in the Gray Herbarium shows nothing unusual in foliage. It differs from the type of the variety and from *Nelson & Macbride*, no. 1318 in having much larger siliques (FIG. 5), up to 5 mm. long and 4 mm. thick. But plenty of eastern specimens of var. *hispida* have fruits meeting or closely approximating these dimensions (Newfoundland: *Fernald & Wiegand*, no. 5487. Quebec: *St. John*, no. 90,493, with tri- or tetra-carpellate siliques (FIG. 6); *W. F. Wight*, no. 269 (FIG. 7). Maine: Houlton, August 26, 1897, *Fernald*; and Massachusetts, Rhode Island and Connecticut, several specimens, including one from Rhode Island, *Thurber* (FIG. 8), upon which Asa Gray made the note "3–4-carpellary!", this forming the basis of the comment by Watson in Gray, Syn. Fl. i<sup>1</sup>. 148 (1895), under *Nasturtium terrestre*, var. *hispidum*, "*Tetrapoma pyriforme*, Seem.<sup>1</sup> . . . is a very closely allied form with globose or pyriform pods, which are often abnormal in the number of carpels (2 to 6) and cells, as occasionally occurs also in var. *hispidum*").

In view of the ready matching of the specimens cited as representing *Rorippa islandica*, var. *glabrata* by foliage and siliques of plants of var. *hispida* from the eastern border of the continent and in view of the occasional occurrence of 3 or 4 carpels in the eastern plant, I find myself unable to subscribe to var. *glabrata* as a well defined variety of the interior.

<sup>1</sup> *Rorippa barbareaefolia* (DC.) Kitagawa in Journ. Jap. Bot. xiii. 137 (1937); A. E. Porsild in RHODORA, xli. 232 (1939).

As already noted N. Busch confused the small-fruited *Rorippa islandica*, var. *hispida* (*R. hispida* (Desf.) Britton), the fruits measuring, according to the table of Butters & Abbe, only 2.2–5.5 mm. long and 1.7–3.7 mm. broad, with the large-fruited *R. barbareaefolia*, with fruits, as correctly stated by Busch, up to 9 mm. long and 5 mm. broad. This species of northeastern Asia and Pacific North America, east to Yukon and south to western Oregon, not only has the very large fruits commonly 3–4-carpellary, but its short and thick style without dilated stigma is characteristic. In well developed plants the fruiting racemes are so like those of *Camelina* that it is easy to see why DeCandolle originally placed the plant in that genus, as *Camelina barbareaefolia*. FIG. 9 is a fruiting inflorescence,  $\times 1$ , of a typical Asiatic plant from Amur, *Maximowicz*. This species, which eventually may have to be considered a very extreme variety of *R. islandica*, with *R. islandica*, var. *occidentalis* (Watson) Butters & Abbe forming the transition, is here noted because two sheets from the northeastern shore of the Gulf of St. Lawrence in Quebec apparently belong to it. These are from grassy shore, Ile Bayfield (Sandy Island), Archipel de St. Augustin, July 21, 1915, *St. John* in Herb. Geol. Surv. Can. no. 90,492; rivages calcaires, luxuriant, Ile Tête-à-la-Baleine, Archipel de Mingan, 12 août, 1925, *Victorin & Rolland*, no. 21,439. These are particularly interesting as adding another to the identities in the flora of the Gulf of St. Lawrence and of the northern Pacific region.

In PLATE 605, FIG. 1 is a representative (ISOTYPIC?) collection,  $\times 1$ , of *Rorippa islandica*, var. *microcarpa* (Regel) Fernald, from Amur, *Maximowicz*, cited by Regel as characteristic; FIG. 2, fruiting branch,  $\times 1$ , from ISOTYPE of var. *Fernaldiana* Butters & Abbe, from Fort Fairfield, Maine, July 6, 1893, *Fernald*; FIG. 3, siliques,  $\times 5$ , of small-fruited extreme of var. *glabrata* (Lunell) Butters & Abbe (cited by them), from Twin Falls and Shoshone Falls, Idaho, *Nelson & Macbride*, no. 1318; FIG. 4, siliques,  $\times 5$ , of small-fruited extreme of var. *hispida* (Desv.) Butters & Abbe, from DeKalb, New York, *Phelps*, no. 514; FIG. 5, silique,  $\times 5$ , from large-fruited extreme of var. *glabrata* (cited by Butters & Abbe), from Santa Fé, New Mexico, *Heller & Heller*, no. 3743; FIG. 6, tri- or tetracarpellate silique,  $\times 5$ , large-fruited extreme of var. *hispida*, from Romaine, Lagorgendière, Saguenay Co., Quebec, *St. John* in Herb. Geol. Surv. Can., no. 90,493; FIG. 7, silique,  $\times 5$ , of large-fruited extreme of var. *hispida*, from Lake St. John, Quebec, *W. F. Wight*, no. 269; FIG. 8, young tri- or tetracarpellate silique,  $\times 5$ , of var. *hispida*, from Rhode Island, 1846, *Thurber*; FIG. 9, raceme,  $\times 1$ , of authentic *R. barbareaefolia* (DC.) Kitagawa, from Amur, *Maximowicz*, identified by Bunge.



VARIETIES OF *RUBUS NUTKANUS*. In 1935 I fell into the nomenclatural trap of taking up for *Rubus nutkanus* Moçino ex Seringe in DC. Prodr. ii. 566 (1825) the earlier name *R. parviflorus* Nutt. Gen. i. 308 (1818), overlooking the very simple fact that the latter is a later homonym of *R. parviflorus* L. Sp. Pl. 1197 (1753). Nuttall's later epithet had been perpetuated by Rydberg in *Rubacer parviflorum* (Nutt.) Rydb. in Bull. Torr. Bot. Cl. xxx. 274 (1903) and in N. Am. Fl. xxii. 426 (1913) and by Greene in *Bossekia parviflora* (Nutt.) Greene, Leaflets, i. 211 (1906), neither of them noting that the basic binomial was a later homonym. I have been informed that the varieties are merely trivial forms which may be found anywhere within the range of the species. This may sometime prove to be the case, but until var. *velutinus* is found more generally than along the Pacific slope in California, var. *Nuttallii* somewhere besides the region of the upper Great Lakes, var. *scopulorum* more generally outside the Rocky Mountain area, var. *bifarius* more generally within the Rocky Mountain area, and var. *parvifolius* north or northwest of Utah and New Mexico, I am constrained to retain them as geographic varieties. Under *Rubus nutkanus* the varieties have the following names.

R. *NUTKANUS* Moçino ex Seringe in DC. Prodr. ii. 566 (1825). *R. parviflorus*, var. *grandiflorus* (as *grandiflora*) Farwell in Am. Midl. Nat. xi. 263 (1929); Fernald in RHODORA, xxxvi. 281, pl. 265, fig. 4 and map 20 (1935).

Var. *bifarius* (Fern.), comb. nov. *R. parviflorus*, var. *bifarius* Fernald, *ibid.* 280 and map 19 (1935).

Var. *hypomalacus* (Fern.), comb. nov. *R. parviflorus*, var. *hypomalacus* Fernald, *ibid.* 277, pl. 364, fig. 5 and map 17 (1935).

Var. *heteradenius* (Fern.), comb. nov. *R. parviflorus*, var. *heteradenius* Fernald, *ibid.* 279, pl. 364, figs. 6 and 7 and map 279 (1935).

Var. *NUTTALLII* Torr. & Gray, Fl. N. Am. i. 450 (1840). *R. parviflorus* Nutt. Gen. i. 308 (1818), not L. (1753). *R. nutkanus*, var. *parviflorus* (Nutt.) Focke in Bibl. Bot. xvii<sup>72</sup>. 124 (1911). *R. parviflorus*, var. *genuinus* Fernald, *ibid.* 277, pl. 364, figs. 1 and 2 and map 15 (1935).

Var. *VELUTINUS* (Hook. & Arn.) Brewer, Bot. Calif. i. 172 (1876). *R. velutinus* Hook. & Arn. Bot. Beech. Voy. 140 (1832), not Vest (1823). *R. parviflorus*, var. *velutinus* (Hook. & Arn.) Greene in Bull. Torr. Bot. Cl. xvii. 14 (1890); Fernald, *ibid.* 277,

pl. 364, figs. 3 and 4 and map 16 (1935). *Rubacer tomentosum* Rydb. in Bull. Torr. Bot. Cl. xxx. 274 (1903).

Var. *SCOPULORUM* Greene ex Focke in Bibl. Bot. xvii<sup>72</sup>. 124 (1911); Fernald, *ibid.* 283, pl. 365, fig. 5 and map 21 (1935).

Var. *PARVIFOLIUS* Gray, in Mem. Amer. Acad. ser. 2, iv. (Pl. Fendl.), 42 (1849). *R. parviflorus*, var. *parvifolius* (Gray) Fernald, *ibid.* 284, pl. 365, figs. 1-3 and map 22 (1935).

*RUBUS*, subg. *EUBATUS*, § **Persistentes**, nom. nov. § *Triviales* Rydb. in N. Am. Fl. xxii. 430 and 435 (1913), non P. J. Muell. in Flora (1858), 176.

The sectional name *Triviales* of P. J. Mueller (1858) for the trailing and pruinose brambles (*R. caesius* L., and others) of Europe, necessitates a new name for our non-pruinose southern dewberries with evergreen or persistent firm glabrous leaves and variously glandular but otherwise glabrous canes.

(To be continued)

AN EXTENSION OF THE RANGE OF *RYNCHOSPORA MACROSTACHYA*.—In 1908, Dr. M. L. Fernald<sup>1</sup> gave the distribution of *Rhynchospora macrostachya* Torr., in New England, as in Massachusetts, Rhode Island, and Connecticut. Blake<sup>2</sup> listed the known stations for the plant in 1913, and from his report, the northernmost extensions appear to be at Braintree and near Amherst, Massachusetts. Peattie,<sup>3</sup> in 1922, reported stations for this plant in south-central Michigan. In 1937, Fernald<sup>4</sup> reported the known distribution on the Atlantic Coastal Plains, and gave isolated locations inland. No stations for the plant are reported for New England north of Massachusetts.

On September 8, 1938, the writer collected *Rhynchospora macrostachya* in York, York County, Maine. There were several hundreds of the plants scattered over a sheltered pond of several acres, which varies in depth from several feet to dryness. A specimen has been forwarded to Gray Herbarium, Neal, No. 2084.—OLIVER M. NEAL, JR., Michigan State College.

<sup>1</sup> Fernald, RHODORA 10: 137, 1908. <sup>2</sup> Blake, RHODORA 15: 19, 1913.

<sup>3</sup> Peattie, RHODORA 24: 87, 1922. <sup>4</sup> Fernald, RHODORA 39: 483, 1937.

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